RESEARCH REPORT

REVITALIZATION OF THE MANUFACTURED HOUSING INDUSTRY IN CANADA TO PROVIDE AFFORDABLE HOUSING EFFECTIVELY

HOUSING AFFORDABILITY AND FINANCE SERIES

CMHC SCHL

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Revitalization of the Manufactured Housing Industry in Canada to Provide Affordable Housing Effectively

1999

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for:

Canada Mortgage and Housing Corporation

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Background

In Canada, mobile homes are usually built to the CAN/CSA-Z240 MH standard (Z240) rather than to the provincial code, although some provinces require mobile homes to be built to the provincial building code. The National Building Code (NBC) forms the basis for regulating all site-built housing.

In the United States, the mobile home industry operates under the federal Housing and Urban Development (HUD) Code—a performance-based code which appears to produce mobile homes with similar performance characteristics to Canadian manufactured mobile homes. MHI Canada suggested that there may be situations where the NBC and its provincial equivalents or the Z240 standard have more stringent requirements than are required for occupant health and safety. MHI Canada also believes that there may be other approaches to manufactured housing that will deliver equivalent housing performance, but at a reduced cost. MHI Canada suggested that an examination of the Canadian and U.S. manufactured home industries (with a focus on mobile homes) experience might identify instances where the standards/codes/ materials/procedures, etc. could be modified to improve housing affordability in Canada.

Because of the above scenario, Canada Mortgage and Housing Corporation (CMHC) designed and approved a project to investigate the situation. MHI Canada, the Canadian Manufactured Housing Institute (CMHI), the National Research Council (NRC), Industry Canada and building officials from Alberta, Ontario and Québec were involved in the advisory committee for the project.

The project began in late 1997 with visits to 11 different Canadian plants (from British Columbia to the Maritime provinces) and one U.S. plant. People familiar with the U.S. market were interviewed. A number of appropriate reports were reviewed during the project. Two project preliminary reports (collections of working papers) were prepared and submitted to the advisory committee. In June 1998, the second preliminary report served as a basis for three round table sessions with the CSA, manufacturers and other parties with a specific interest in the subject matter.

This report is the official record of the project.

Executive Summary and Proposed Plan of Action

The project second preliminary report (dated April 20, 1998) was a collection of five working papers which were the basis of round table discussions involving people interested in the manufactured housing industry in Canada. These discussions were called for in the statement of work for CMHC.

The working papers identified a significant difference between Canada and the United States regarding the penetration of manufactured housing in the housing markets of the two countries. The United States has experienced greater penetration than has been the case in Canada, particularly in recent years.

Indications are that this difference in market penetration in the two countries has been caused by nine factors, some of which are interrelated.

Use of land for manufactured homes. In the United States, the Manufactured Housing Institute (MHI) has a relatively aggressive legal program to protect the industry's land zoning position, while land use problems continue to plague the industry in Canada.

Sensitivity to product costs—affordability. The Canadian industry has, in recent years, lost some focus on affordability relative to the U.S. industry. Indications from the study are that Canadian Z240 product is 25 to 32 per cent higher priced than U.S. Housing and Urban Development (HUD) product at the factory door (in terms of Canadian dollars). Some Canadian manufacturers dispute these indicated price differences, but they are relevant and need to be considered in an objective manner by the Canadian industry.

Building codes. The National Commission on Manufacturing Housing[1] estimated that HUD product in the United States enjoyed a 12 per cent material cost advantage over site-built housing in 1994.

A simple comparative study of product built in U.S. plants to both HUD Code and Z240 standards indicates that there is a material cost difference of some US$3,100 between a typical 4.26 m by 21.3 m (14 ft by 70 ft) HUD Code product and product built to Z240 standards for sale in Ontario. These numbers indicate that the Z240 products are typically priced higher by some US$4,650, i.e., C$6,620. In percentage terms, the code-driven cost differences give rise to a higher factory price of some 23.6 per cent. The range of this code-driven difference is likely 20 to 25 per cent over a series of different floor plans.

It is true that Canadian manufacturers of HUD Code product for the U.S. market find their HUD code product built for the U.S. market is more expensive than building Z240 product. Significant material cost advantages of the HUD Code are, in the main, not being realized by Canadian manufacturers in this situation. The relatively low number of units being exported to the United States precludes the re-engineering of Canadian product for the U.S. market. To realize the cost advantages of a HUD product, such re-engineering would be necessary.

In summary, indicated percentage factory price differences between U.S. HUD Code product and Z240 product are 25 to 32 per cent; 80 per cent of this difference appears to be code related.

Use of foam adhesives. Although there is disagreement in Canada regarding the use and advantages of this product, it needs to be viewed with an objective business-like approach. It is the single most obvious operational difference in U.S. and Canadian plants. Over 90 per cent of U.S. plants use these materials to fabricate ceiling and exterior wall sub-assemblies while no Canadian plant utilizes these materials in such operations.

Insufficient focus on domestic markets. The project investigation found significant indications that there has been, in recent years, an undue amount of energy and time spent by the industry on exporting opportunities at the expense of the domestic market.

Fragmented industry association approach in Canada. At a time when a strong national industry voice is needed, there are two associations, both doing good work but, to some extent, duplicating efforts. Recent cooperation between the two associations is encouraging from an industry perspective and is certainly overdue.

Distribution system. The historical importance of the mobile home dealers has, to some extent, been forgotten by the industry in Canada relative to the United States. Changes in distribution methods are occurring in the United States that need careful study by the Canadian industry.

Increasing percentage of multiple-section homes built under HUD Code in the United States. Present U.S. experience indicates that HUD Code product is receiving wide acceptance, and more and more of this product is double-wide or multiple-section product (52 per cent in 1996 and 58 per cent in 1997). In comparison, the percentage of manufactured home shipments that were multiple section in Canada are 42, 44 and 34 per cent for 1995, 1996 and 1997 respectively. (Québec data not included for 1997.)

HUD product has been part of mainstream housing in the United States for a number of years and has greater consumer acceptance than Z240 product in Canada. The matrix analysis shown in Table 1 outlines the estimated relative importance of the above factors. These estimates are based on discussions with industry personnel, related observations in various factories and feedback received from the project second preliminary report and the associated round table sessions.

Also included is a preliminary draft network plan of action which emanates from the body of the original working papers, subsequent feedback and round table sessions. Each arrow on the network plan (Figure 1) identifies a significant activity which will take time and resources. The logical relationship between each arrow or activity is shown by the arrow configuration. Arrows (activities) shown in parallel can be carried out at the same time; arrows (activities) shown in series, i.e., following each other, demand that the first activity be completed before the following activity is started (at least as much as is theoretically possible). Each circle is called an event and is a point in time; it is identified with a number. The numbers have no time meaning. Rather, they serve as identifiers of the events and, of course, each activity. The critical path is the longest estimated time through the network and dictates the expected finish date. Every activity on the critical path requires constant attention because these are the activities that are most likely to delay the finish date of the project.

Table1:
Matrix analysis of reasons for widening difference in manufactured housing penetration in United States and Canada

Likely reasons for difference	United States	Canada	Estimated relative importance** %
(1) Use of land for manufactured homes	moderate	weak	20
(2) Sensitivity to product costs*	strong	de-emphasized in recent years	20
(3) Codes	strong—HUD	benign neglect of Z240	15
(4) Use of foam adhesives	over 90%	lagging—not approved yet	10
(5) Focus on domestic markets	strong	too much energy spent on export	10
(6) Effective national association	strong—MHI	fragmented	10
(7) Consumer acceptance of mobile home product*	high	low—moderate	8
(8) Distribution system development and support	sound	weak	4
(9) Increasing % of multi-sect. mobile home production	58%—1997	34%—1997 Cdn % does not include Québec	3

Notes:
* Customer expectations appear to be higher in Canada than in the United States.
** Estimates derived from observation and dialogue with industry representatives.
Numbers (2), (3) and (4) have an important relationship to each other in the matter of affordability.
Numbers (5) and (6) have an important relationship to each other.
Numbers (1), (7), (8) and (9) have a relationship to each other.

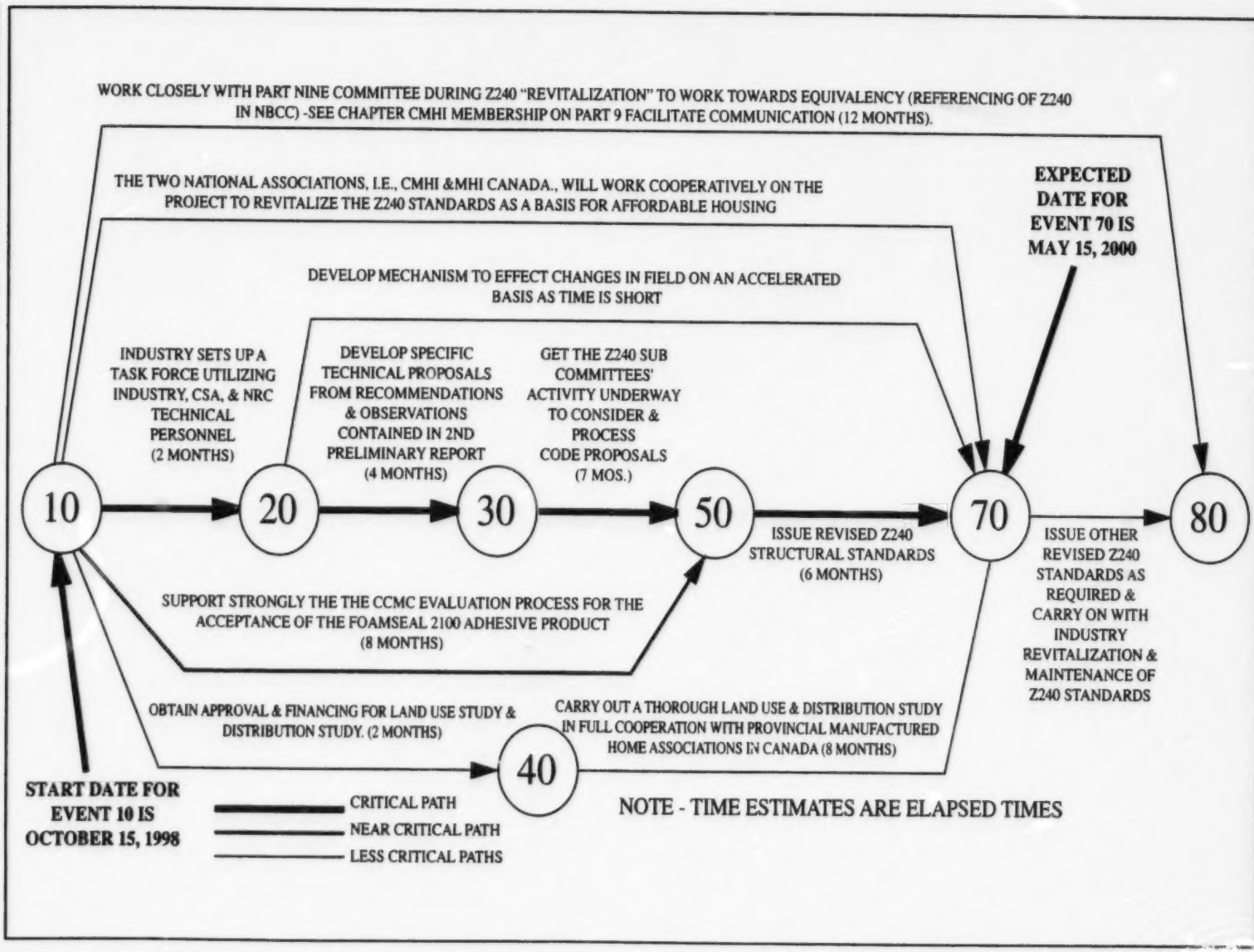
WORK CLOSELY WITH PART NINE COMMITTEE DURING Z240 "REVITALIZATION" TO WORK TOWARDS EQUIVALENCY (REFERENCING OF Z240 IN NBCC) -SEE CHAPTER CMHI MEMBERSHIP ON PART 9 FACILITATE COMMUNICATION (12 MONTHS).
THE TWO NATIONAL ASSOCIATIONS, I.E., CMHI &MHI CANADA., WILL WORK COOPERATIVELY ON THE PROJECT TO REVITALIZE THE Z240 STANDARDS AS A BASIS FOR AFFORDABLE HOUSING
EXPECTED DATE FOR EVENT 70 IS MAY 15, 2000
DEVELOP MECHANISM TO EFFECT CHANGES IN FIELD ON AN ACCELERATED BASIS AS TIME IS SHORT
INDUSTRY SETS UP A TASK FORCE UTILIZING INDUSTRY, CSA, & NRC TECHNICAL PERSONNEL (2 MONTHS)
DEVELOP SPECIFIC TECHNICAL PROPOSALS FROM RECOMMENDATIONS & OBSERVATIONS CONTAINED IN 2ND PRELIMINARY REPORT (4 MONTHS)
GET THE Z240 SUB COMMITTEES' ACTIVITY UNDERWAY TO CONSIDER & PROCESS CODE PROPOSALS (7 MOS.)
10
20
30
50
70
80
ISSUE REVISED Z240 STRUCTURAL STANDARDS (6 MONTHS)
ISSUE OTHER REVISED Z240 STANDARDS AS REQUIRED & CARRY ON WITH INDUSTRY REVITALIZATION & MAINTENANCE OF Z240 STANDARDS
SUPPORT STRONGLY THE THE CCMC EVALUATION PROCESS FOR THE ACCEPTANCE OF THE FOAMSEAL 2100 ADHESIVE PRODUCT (8 MONTHS)
OBTAIN APPROVAL & FINANCING FOR LAND USE STUDY & DISTRIBUTION STUDY. (2 MONTHS)
CARRY OUT A THOROUGH LAND USE & DISTRIBUTION STUDY IN FULL COOPERATION WITH PROVINCIAL MANUFACTURED HOME ASSOCIATIONS IN CANADA (8 MONTHS)
40
START DATE FOR EVENT 10 IS OCTOBER 15, 1998
CRITICAL PATH
NEAR CRITICAL PATH
LESS CRITICAL PATHS
NOTE - TIME ESTIMATES ARE ELAPSED TIMES

Figure 1:
Recommended Plan of Action for the Canadian Manufacturing Housing Industry

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CHAPTER 1: RELATIVE MARKET PENETRATION IN CANADA AND THE UNITED STATES

The declining share of the factory-built housing segment of the single-family housing market in Canada relative to the experience in the United States is real and troubling.

This section of the report is meant to put the Canadian and U.S. market situations in some perspective. Sufficient data have been gathered to compare market penetration in the two countries in a realistic manner.

Early in the project, there was some confusion and indeed debate among people in the Canadian industry about the difference in market penetration in the two countries. Therefore, significant time was spent on this subject, resulting in the preparation of four drafts of a working paper prepared for discussion with the industry. The comparative market penetration challenge the Canadian industry faces is very significant and is a concern to many people in the industry. This chapter attempts to answer the question as objectively as possible: How are we doing regarding market penetration in Canada compared to the industry in the United States?

Table 2 gives an outline of overall trends in the United States and Canada for the last 26 years. In the United States, the industry has, in recent years, arrested the decline in the penetration of manufactured homes as a percentage of single-family home starts with the percentage penetration increasing in 1993. In Canada, the industry seems to be, at best, flat in recent years based on this particular measurement, albeit there were some lower years back in the middle 1980s when the Canadian industry was going through significant turmoil and restructuring. (A number of plants went out of business at that time.) In the early 1970s, the percentage penetration in Canada was approximately double what it is today. The comparison of the totals for the period 1980 to 1997 is noteworthy. The percentage was 20.17 per cent in the United States compared to 6.17 per cent for Canada—a significant difference.

A difficulty in the manufactured housing shipping data displayed in Table 2 is that they are not truly comparable for the two countries. The MHI data from the United States relates to HUD Code product shipments from 1974 forward, while the Canadian data from the Canadian Manufactured Housing Institute (CMHI) includes both Z240 product shipments and modular home shipments (CSA—A277 labels) for the years 1987 to 1994. From 1995 forward, because of Alberta's decision to require A277 certified product, the Canadian data are reported as single- section or multiple-section home shipments. CMHI staff members separated the data for these years, i.e., 1995 to 1997, into Z240 and A277 product to assist in the preparation of this report.

Because many U.S. manufacturers feel strongly, with some justification, that the availability of the effective national HUD Code for manufactured housing is a fundamental reason for the success of housing market penetration in that country, it has been suggested by industry personnel in Canada that it is more realistic to compare HUD shipments in the United States to Z240 shipments in Canada. Figure 2 illustrates this comparison for the years 1987 to 1997. This graphical presentation strongly indicates that there has been a widening market penetration "spread" beginning in 1993. The increasing penetration, beginning in 1993 in the United States, is likely related to two significant reasons.

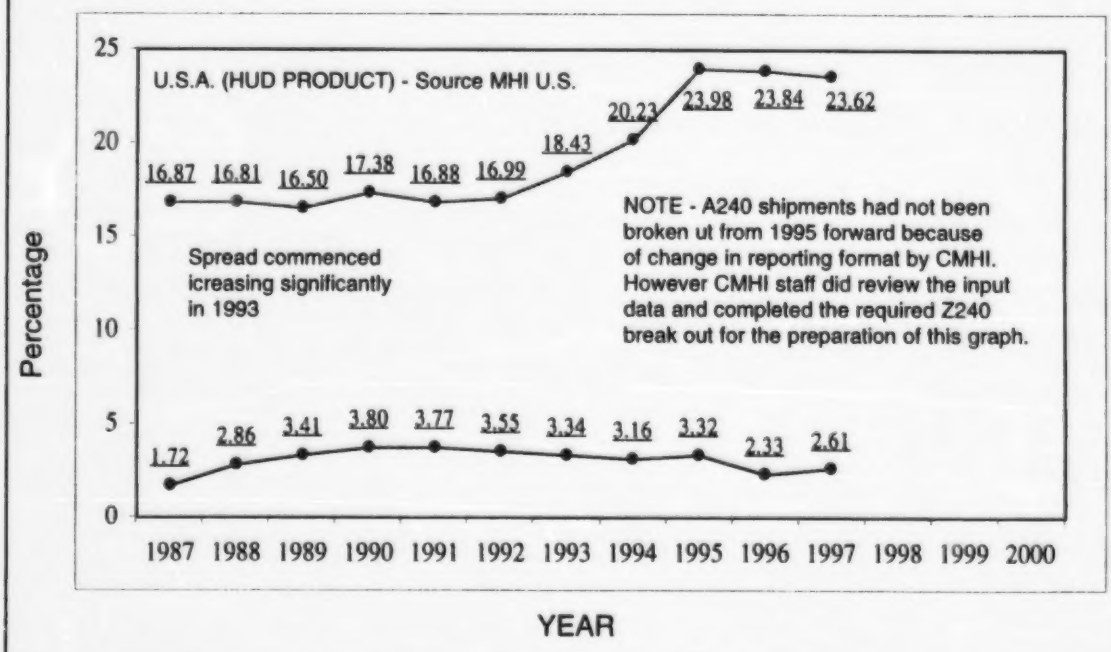
- According to MHI, multi-section shipments of HUD product in the United States represented 58 per cent of all HUD shipments during 1997. This compares to 52 per cent in 1996 and 35 per cent in 1981. Multi-section shipments through June 1998 represented 59.7 per cent of industry shipments compared to 55.4 per cent through June 1997. This trend to increased multi-section HUD units is an indication that many "in fills" and similar land use U.S. programs are benefiting manufacturers building HUD product. In the report, "The Future of Manufactured

Table 2:
Comparison of manufactured house shipments as a % of manufactured house shipments plus single family starts in the United States and Canada

	Canadian information—CMHI				U.S. Information - MHI (U.S.)			
Year	**Mfg house shipments**	**Single family starts**	**Total MHS + SFS**	**MH shipments % of total**	**Mfg house Shipments**	**Single family starts**	**Total MHS + SFS**	**MH shipments % of total**
1972	25,003	133,891	158,894	15.74	579,960			
1973	28,338	152,162	180,500	15.70	579,960			
1974	32,506	148,284	180,790	17.98	338,393			
1975	21,627	138,513	160,140	13.51	212,690			
1976	21,394	154,307	175,701	12.18	246,120			
1977	14,098	117,953	132,051	10.68	265,641			
1978	10,447	116,002	126,449	8.26	274,901			
1979	8,305	117,580	125,885	6.60	276,121			
1980	6,800	94,521	101,321	6.71	221,091	852,200	1,073,291	20.60
1981	7,186	96,257	103,443	6.95	240,313	705,400	945,713	25.41
1982	3,838	58,295	62,133	6.18	238,808	662,600	901,408	26.49
1983	5,038	107,423	112,461	4.48	295,079	1,067,600	1,362,679	21.65
1984	3,813	87,392	91,205	4.18	294,993	1,084,200	1,379,193	21.39
1985	3,247	101,861	105,108	3.09	283,489	1,072,400	1,355,889	20.91
1986	3,585	123,593	127,178	2.82	244,660	1,179,400	1,424,060	17.18
1987	6,976	143,375	150,351	4.64	232,598	1,146,400	1,378,998	16.87
1988	9,218	132,493	141,711	6.50	218,429	1,081,300	1,299,729	16.81
1989	9,640	130,742	140,382	6.87	198,254	1,003,300	1,201,554	16.50
1990	9,222	106,559	115,781	7.97	188,172	894,800	1,082,972	17.38
1991	6,898	90,207	97,105	7.10	170,713	840,400	1,011,113	16.88
1992	7,385	96,953	104,338	7.08	210,787	1,303,100	1,240,887	16.99
1993	7,390	88,263	95,653	7.73	254,276	1,125,600	1,379,876	18.43
1994	7,677	93,041	100,718	7.62	303,932	1,198,400	1,502,332	20.23
1995	6,741	64,425	71,166	9.47	339,601	1,076,300	1,415,901	23.98
1996	6,599	77,996	84,595	7.80	363,411	1,160,900	1,524,311	23.84
1997	5,102	75,394	80,496	6.34	353,377	1,133,500	1,486,877	23.77
TOTALS (1972-1997)	278,073	2,847,482	3,125,555	8.90	7,425,769			
TOTALS (1980-1997)	116,355	1,768,790	1,885,145	6.17	4,651,983	18,314,800	22,966,783	20.26

Note:
Manufactured house shipments for the United States are HUD Code product only and Canadian shipments include both Z240 and A277 product.

Figure 2:
Comparison of HUD product shipments in United States as a % of the total of single family starts plus HUD shipments and Z240 product shipments in Canada as a % of the total of single family starts plus Z240 shipments


U.S.A. (HUD PRODUCT) - Source MHI U.S.
16.87 16.81 16.50 17.38 16.88 16.99 18.43 20.23 23.98 23.84 23.62
1.72 2.86 3.41 3.80 3.77 3.55 3.34 3.16 3.32 2.33 2.61
Spread commenced icreasing significantly in 1993
NOTE - A240 shipments had not been broken ut from 1995 forward because of change in reporting format by CMHI. However CMHI staff did review the input data and completed the required Z240 break out for the preparation of this graph.
Percentage
25
20
15
10
5
0
1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000
YEAR

Housing" (Vermeer and Louie, 1997) prepared at the Joint Center for Housing Studies of Harvard University, it is pointed out that the increase in the average size of manufactured homes between 1981 and 1995 was 33.5 per cent—from 94.3 m² (1,015 sq ft) in 1981 to 125.9 m² (1,355 sq ft) in 1995—compared to a 22.8 per cent increase in site-built single family homes.

- Traditionally, the mobile home industry in the United States has tended to increase business activity during periods of economic slow down. Such a period occurred in the United States in the early 1990s. This led to increased shipments of relatively affordable HUD Code product. A noteworthy observation is that in the United States the increased penetration has essentially been sustained during the last three years of relatively solid economic expansion. In Canada, if anything, the penetration appears to be declining during the same period.

Figure 3 examines the trend of the penetration "spread" identified in Figure 2 from 1990 to 1997 on a macro basis. It is a comparison of the total manufactured home shipment data from MHI in the United States (HUD product plus modular home consumption) and the total Canadian manufactured home shipment data from CMHI (both Z240 and A277 product).

Hallahan & Associates in Baltimore, Md. compile data on the consumption of modular homes in the United States. (The National Home Builders Association in the United States uses Mr. Hallahan's data.) Table 3 shows national consumption data obtained from Mr. Fred Hallahan.

Figure 3:
1990s trend of total mfg. home shipments as a percentage of the total of mfg. home shipments and single family starts for the United States and Canada
U.S. mfg. homes include HUD product shipments (MHI—U.S.) and modular home consumption in the U.S. according to Fred Hallahan and Associates. Canada mfg. homes include Z240 product and a 277 product

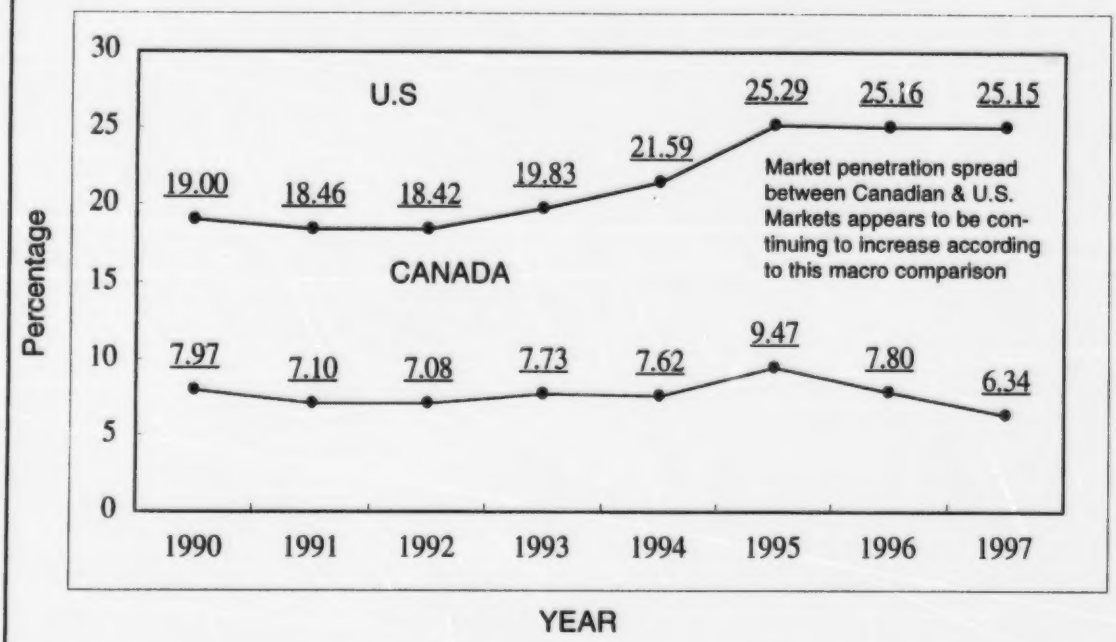


Table 3:
Modular home consumption, United States

Year	Number of units
1987	29,567
1988	28,172
1989	25,847
1990	21,605
1991	19,498
1992	21,796
1993	24,168
1994	25,798
1995	24,710
1996	26,840
1997	27,500

Within the last 11 years, modular housing consistently accounted for between 1.9 and 2.1 per cent of total building permits issued in the United States according to Mr. Hallahan. Most of this modular activity has been in the mid-western and northeastern states where the market share has been as high as six to seven per cent in selected states. Table 4 presents an interesting comparison of the mobile home and modular home experience in the United States and Canada. The inclusion of all A277 product as modular in Canada is not completely comparable to the U.S. situation. Much of this A277 product is, in fact, still traditional mobile home-type product. In addition, it is estimated that somewhere between 50,000 and 100,000 units included in the HUD home shipment data in the United States are closer to what we might call a modular home (double-wide A277) in Canada. However, the comparison shown in Table 4 has some meaning. These data indicate that the Canadian industry, in recent years, has been focussed on modular homes or certainly "up market" or "higher priced" product from a domestic point of view resulting in a lower relative overall market penetration by factory-built homes in Canada.

Table 4:
An overview comparison of mobile homes and modular homes in Canada and the United States

Canada

Year	A Z240 shipments	Percentage of total	B A277 shipments	Percentage of total	C S.F. home starts	Percentage of total	A+B+C Total
1987	2,506	1.72	4,399	2.93	143,375	95.41	150,280
1988	3,899	2.86	5,190	3.67	132,493	93.58	141,582
1989	4,604	3.41	4,977	3.55	130,472	93.16	140,053
1990	4,170	3.77	5,009	4.33	106,559	92.07	115,738
1991	3,465	3.70	3,400	3.50	90,207	92.93	97,072
1992	3,572	3.55	3,793	3.64	96,953	92.94	104,318
1993	1,994	2.21	4,321	4.57	88,263	93.32	94,578
1994	2,213	2.32	4,632	4.64	93,041	93.15	99,886
1995	1,996	3.01	4,451	6.28	64,425	90.90	70,872
1996	1,875	2.35	4,714	5.57	77,996	92.21	84,585
1997	2,020	2.61	3,040	3.78	75,394	93.71	80,454

Notes:
Canadian data based on CMHI reports (NWT/YUKON not included).
1997 data do not include Québec.

United States

Year	A HUD shipments	Percentage of total	B Mod. homes consumed	Percentage of total	C S.F. home starts	Percentage of total	A+B+C total
1987	232,598	16.51	29,567	2.10	1,146,400	81.39	1,408,565
1988	218,429	16.45	28,172	2.12	1,081,300	81.43	1,327,901
1989	198,254	16.15	25,847	2.11	1,003,300	81.74	1,227,401
1990	188,172	17.04	21,605	1.96	894,800	81.01	1,104,577
1991	170,713	16.57	19,498	1.89	840,000	81.54	1,030,211
1992	210,787	16.69	21,796	1.73	1,030,100	81.58	1,262,683
1993	254,276	18.11	24,168	1.72	1,125,600	80.17	1,404,044
1994	303,932	19.89	25,978	1.70	1,198,400	78.41	1,528,310
1995	339,601	23.57	24,710	1.72	1,076,300	74.71	1,440,611
1996	363,411	23.43	26,854	1.73	1,160,900	74.84	1,551,165
1997	353,377	23.33	27,500	1.82	1,133,500	74.85	1,514,377

Notes:
U.S. data based on MHI reports and Hallahan & Associates.
1997 modular home data are estimated.

Accepting a relatively lower market penetration by building higher-priced product may not be the best long-term business strategy for the Canadian industry. In any case, it is very important for Canadian manufacturers to fully understand the implications of the trend of moving upscale. Based on the general U.S. experience with modular home product relative to HUD product, the Canadian manufactured home industry will likely be much smaller in the years to come if present trends continue.

The MHI in the United States also measures manufactured housing shipments as a percentage of single family homes sold. This specific measurement of market penetration shows an even more favourable percentage penetration in the United States, and these data are outlined in Table 5. Once again, Table 5 reinforces the observation that the manufactured housing industry in the United States has achieved greater penetration of the total housing market than has been the experience in Canada in recent years. According to these data for the last four years, over 30 per cent of new homes sold in the United States are HUD Code homes, an impressive performance.

Table 6 outlines the history of manufactured home shipments in the two countries with a side by side comparison to single family housing starts for 1980 to 1997. Other than in the early 1970s (around the time CSA Z240 standards were fully adopted by the Canadian industry), the Canadian manufactured home industry has never come close to achieving 10 per cent of the shipments experienced by the U.S. industry. (Certainly, the often used 10 per cent rule between the two countries in marketing studies has not been applicable to factory-built housing in recent years.)

The overall average of Canadian manufactured housing shipments as a percentage of U.S. shipments during the last 26 years was found to be 3.74 per cent. The Canadian industry has not even achieved this low percentage during the last five years. The comparison between the two countries regarding single family housing starts shown in Table 6 is interesting and worth

Table 5:
U.S. manufactured home shipments as a % of new single family homes sold

	Mfg. home	New S.F. homes shipments	Total sold	M.H. shipments % of total
1980	221,091	545,000	766,091	28.9
1981	240,313	436,000	676,313	35.5
1982	238,808	412,000	650,808	36.7
1983	295,079	623,000	918,079	32.1
1984	294,993	639,000	933,993	31.6
1985	283,489	688,000	971,489	29.2
1986	244,660	750,000	994,660	24.6
1987	232,598	671,000	903,598	25.7
1988	218,429	676,000	894,429	24.4
1989	198,254	650,000	848,254	23.4
1990	188,172	534,000	722,172	26.1
1991	170,713	507,000	677,713	25.2
1992	210,787	610,000	820,787	25.7
1993	254,276	666,000	920,276	27.6
1994	303,932	670,000	973,932	31.2
1995	339,601	667,000	1,006,601	33.7
1996	363,411	758,000	1,121,411	32.4
1997	353,377	801,000	1,154,377	30.6

Source:
MHI (United States)

Table 6:
Housing trends 1980–1997

	Single family housing starts			Mfg. home shipments		
	United States	Canada	Canada as % of United States	United States	Canada	Canada as % of United States
1980	852,200	94,521	11.09	221,091	6,800	3.08
1981	705,400	96,257	13.65	240,313	7,186	2.99
1982	662,000	58,295	8.81	238,808	3,838	1.61
1983	1,067,600	107,423	10.06	295,079	5,038	1.71
1984	1,084,200	87,392	8.06	294,993	3,813	1.29
1985	1,072,400	101,861	9.50	283,489	3,247	1.15
1986	1,179,400	123,593	10.48	244,660	3,585	1.47
1987	1,146,400	143,375	12.51	232,598	6,975	3.00
1988	1,081,300	132,493	12.25	218,429	9,218	4.22
1989	1,003,300	130,742	13.03	198,254	9,640	4.86
1990	894,800	106,559	11.91	188,172	9,222	4.90
1991	840,400	90,207	10.73	170,713	6,989	4.09
1992	1,030,100	96,953	9.41	210,787	7,385	3.50
1993	1,125,600	88,263	7.84	254,276	7,390	2.91
1994	1,198,400	93,041	7.76	303,932	7,677	2.53
1995	1,076,300	64,425	5.99	339,601	6,706	1.97
1996	1,160,900	77,996	6.72	363,411	6,655	1.83
1997	1,133,500	75,394	6.65	353,377	5,102	1.44
Totals	18,314,200	1,768,790	9.66	4,651,983	116,466	2.50

Notes:

Canadian manufactured home shipments are totals of mobile homes (Z240) and modular (A277).
U.S. manufactured home shipments are shipments of HUD product only.
In 1974, Canadian manufactured home shipments were 9.61 percent of U.S. shipments.
In 1975, Canadian manufactured home shipments were 10.71 percent of U.S. shipments.
In 1976, Canadian manufactured home shipments were 8.69 percent of U.S. shipments.

consideration. For the period 1980 to 1997, Canada's single family home starts were 9.66 per cent of those in the United States (very close to the traditional 10 per cent figure identified in many marketing studies comparing the two countries). In summary, the data in Table 6 further support the observation that there continues to be a decline of the penetration of Canadian factory-built (mobile and modular combined) homes in Canada compared to the United States. This does not augur well for the Canadian manufactured housing industry.

On a number of occasions during this project, the argument was presented that the general climate of the United States is much more favourable to factory-built housing, particularly in the southern states (warmer climate, lifestyle, etc.). Proponents of this explanation claim that this is a significant reason for the disparity between national figures for the Canadian and U.S. situations. These same people urged an analysis of the northern states. Therefore, an attempt to obtain data to support this premise was made and Table 7 is the result of these activities. While the manufactured housing industry in the border states certainly experienced a lower market penetration (based on shipments plus building permits) than the whole of the United States during 1997, it is very evident that these same border states have consumed factory-built homes (specifically HUD code homes) to a much larger extent than in Canada. Simply put, the industry is getting a significantly larger share of the housing market in the United States compared to the Canadian experience, *including the border states.*

In the January 1993 issue of *American Demographics*, a coloured map of the United States (based on the U.S. 1990 census) was used to show the percentage of existing housing, by county, accounted for by mobile homes. This same document appeared in a report from Harvard University (Vermeer and Louie, 1997) and was distributed at round table sessions during this project. In a large number of counties in the

Table 7:
Mfg. home shipments as % of mfg. home shipments plus bldg. permits in the U.S. states bordering Canada for 1997

State	Mfg. home shipments	Building permits	Total MHS + B P	% MH of total
Washington	6,419	29,688	36,107	17.78
Idaho	2,634	8,428	11,062	23.81
Montana	1,681	1,380	3,061	54.92
North Dakota	940	984	1,924	48.86
Minnestoa	3,217	20,044	23,261	13.83
Wisconsin	3,625	19,321	22,946	15.80
Illinois	4,334	32,418	36,752	11.79
Indiana	8,913	28,192	37,105	24.02
Michigan	11,836	38,834	50,670	23.36
Ohio	8,009	32,728	40,737	19.66
Pennsylvania	6,266	31,189	37,455	16.73
New York	4,209	19,878	24,087	17.47
Vermont	551	1,682	2,233	24.68
New Hampshire	825	4,297	5,122	16.11
Maine	551	1,682	2,233	24.68
Border states total	64,010	270,745	334,755	19.12
All other states	289,367	781,465	1,070,832	27.02
Total U.S.A.	353,377	1,052,210	1,405,587	25.14
Border states as % of total	18.11	25.73	23.82	

Source:
MHI (United States)

United States, more than 14 per cent of the existing housing is HUD product. Of all existing housing in the United States at that time, 7.24 per cent were reported to be mobile homes. These are impressive numbers for the mobile home industry in that country. It is important to observe that HUD product has been part of mainstream housing in the United states for a number of years and has greater consumer acceptance than Z240 product in Canada.

Summary and comments

The industry in the United States is enjoying greater market penetration than in Canada. The manufacturers and the various stakeholders of the Canadian manufacturing home industry must gain an effective and continuing understanding of this disparity and use this increased understanding to work cooperatively to change what must be changed to achieve greater market penetration in Canada.

The trends outlined in this chapter are, or should be, of serious concern and, if they continue, it could ultimately lead to the demise of the manufactured housing industry in Canada as we know it. This would be a tragic happening and certainly a great disservice to Canada and its citizens. It is hoped this project, along with others, will contribute to a needed revitalization of the industry.

CHAPTER 2: AFFORDABILITY OF THE PRODUCT IN CANADA RELATIVE TO THE UNITED STATES

The Canadian industry has, to some extent, forgotten its roots, that is, affordable housing.

With the increased demand from the market for product variation (the mentality of "you can have any colour as long as it is black" has not been evident in the industry for many years), there is reduced opportunity for assembly line efficiencies. The situation requires greater investment in planning and engineering. Mr. Ian Bazley's report, "Opportunities for Change in the Canadian Manufactured Housing Industry" (1996) is full of sound suggestions to assist manufacturers in facing the changing market challenges. There is little evidence, as yet, that this report is being used in an effective manner by the Canadian industry. Recently, a chief executive officer of a Canadian corporation in the manufactured home business mused that perhaps his company will need to carry out some significant process changes to meet the challenges in the market place; he is very likely correct. The challenge of the increased use of drywall in product was described at some length in the second working paper of the project. The foam adhesive solution developed in the United States some years ago came about because Foamseal Urethane Technology accepted a challenge from Champion Enterprises, currently the largest producer of manufactured homes in the United States. The rest is history—a history and experience we have unfortunately not taken advantage of in Canada.

There are strong differences of opinion within the Canadian industry about the use of foam adhesives. Nevertheless, it is essential that these products be seriously considered by Canadian manufacturers. Consider the following observations.

- Over 90 per cent of U.S. plants are using the product.
- For regulatory reasons and some reluctance on the part of Canadian manufacturers, the product is not being utilized in Canada.
- The market penetration of manufactured housing product in the United States is significantly greater than in Canada.
- It is reasonable to conclude that there may be some logical connections regarding the above statements.

The third draft of working paper 2 which appeared in the project second preliminary report (dated April 20, 1998) gave a more detailed description of the use of foam adhesives in manufactured housing in North America. At the suggestion of a number of people attending the project round table sessions, this material has not been repeated in this report but is available from CMHC or the author. During the preparation of working paper 2, extensive use of two reports is acknowledged. These are "Opportunities for Change in the Canadian Manufactured Housing Industry" (Bazley, 1996) and "Feasibility Study of the Applicability of Foam Adhesives in Canadian Manufactured Housing" (Scanada, 1997).

There seems to be a tendency for the Canadian industry to try to be all things to all people. The raison d'être of the manufactured housing industry has always been, and still is, to provide affordable housing. It should be pointed out that affordable housing does not equate with the word "cheap" but it certainly must equate with the word "value," and the Canadian industry has an effective history of providing affordable, value housing. Losing this important focus could be a serious, even fatal, mistake.

It is noteworthy that some Canadian manufacturers are building park models at specific times of the year under CSA standard Z241. Listening to those manufacturers reminds one of the start of the mobile home industry in Canada. To some extent, the building of park models appears to be the re-invention of the mobile home industry (or the more preferred term in the Maritimes of "mini homes") to provide affordable housing. This park model thrust relates to demographic factors (retiring

baby boomers, etc.) and also to the continuing and important need for shelter affordability. Ontario has made it very clear that it was never intended that the CSA Z241 standard be used for the production of homes used on a four season or year-round basis. There are preliminary indications that these park models are running into some difficulties regarding zoning and land taxing regulations. If this is true, it could lead to additional difficulties that the industry can ill afford at present.

While the marketing strategy is the unique concern and responsibility of an individual plant, there seems to be a tendency on the part of the Canadian industry as a whole to try product approaches that do not always adequately consider the restrictions of an assembly line situation. At the same time, there is a tendency to ignore the advantages of a factory environment which are significant. Assuming that factory-built housing can compete directly and effectively with traditional site homebuilders, from an architectural perspective, may be very premature at best and a strategic mistake at worst. While there is certainly evidence of innovative product designs and methods in a number of Canadian factories, there is generally less concern about costs and the ultimate cost to the consumer than has been traditional in the Canadian industry in years gone by. The U.S. industry has certainly not forgotten about the importance of affordability, (even though there is increasing demand for upscale product in that country as well), while the Canadian industry has lost its focus to some extent. (If you do not know where you are going, it doesn't really matter which road you take.) This relative loss of direction or focus is contributing to the differences in levels of success of manufactured housing in the two countries.

In the December 1997 edition of *Automated Builder* (www.autobldrmag.com), there is a published ranking of the top 100 industrialized building producers. Champion Enterprises Inc., Fleetwood Enterprises Inc., Oakwood Homes Corporation, Skyline Corporation and Schult Homes are the top five manufactured home producers in the United States in terms of sales dollars. The overall average price of homes at the factory door for all these companies combined is US$23,066 (actual company values range from US$18,296 to US$26,821). At an exchange rate of 1.42, this average value translates to C$32,753. An assessment of three plants in Western Canada during 1995 indicates that the average selling price was C$43,321 (actual plant averages ranged from C$35,000 to C$47,000). This indicated difference of some C$10,748 Canadian amounts to a 32 per cent difference in affordability between the United States and Canada. This difference in average price cannot be explained away by economies of scale or even consumer-driven upgrades (although these are certainly factors). It is much more than that. The industry in Canada has lost its focus when it comes to the important question of affordability. It is noteworthy that the U.S. manufactured housing industry attempts to achieve a 25 to 30 per cent price differential (sometimes called the 75 per cent rule) between HUD Code manufactured homes and site-built homes in order to penetrate the U.S. housing market successfully. This observation is further confirmed from the Harvard University Study (Vermeer and Louie, 1997: 19). "Although simple comparisons of sales price data during any one year may exaggerate price differences, estimates that combine structure, transport, installation, land, and site development costs in the United States suggest that the total purchase of a manufactured home may be as little as 75% of the total purchase of the cost of a site built home of comparable size and quality."

In a comprehensive study of the manufactured housing industry, the University of Michigan (Johnson and Scheuer, 1993) developed a more precise comparison of the total initial cost to purchase various types of manufactured and site-built housing. The study estimated that in 1991, a typical new 133.8 m² (1,440 sq ft) multi-section manufactured home in Michigan cost US$76,560. The estimate included US$38,560 to purchase the unit, US$8,000 for the installation costs and US$30,000 for a 0.13 hectare (one-third acre) lot of land. In contrast, a 133.8 m² (1,440 sq ft) site-built home on 0.4 hectares (one acre) of land could be purchased for US$114,680 (including

$30,000 for the cost of land). This specific example from the Michigan study indicates that the manufactured home costs 65.9 per cent of the cost of a site-built home.

During this project, a number of attempts to compare factory sales dollars on a per square foot basis for Canadian and U.S. manufactured homes were carried out. These comparisons were shared with attendees of the project round table sessions on June 12-13, 1998 and June 27, 1998.

Table 8 attempts to summarize these data and information.

A number of Canadian manufacturers do not accept that U.S. product is more affordable than Canadian manufactured homes, but the above data challenge this. The data indicate that there is an average 25 per cent difference at the factory door on a per square foot cost basis, i.e., Canadian product is 25 per cent more expensive than U.S. product. Based on the lowest numbers in Table 8, it is possible that some lower-priced single-wide units produced in Canadian plants compete with U.S. product from a price perspective.

Nevertheless, there is an apparent affordability problem with Canadian product, and to continue to deny this may prove to be dangerous for the Canadian industry.

Based on the above assessments, there is an indicated affordabilty difference between Canadian and U.S. product of 25 per cent (based on sq ft assessment) and 32 per cent (based on the macro price assessment).

Three comments from U.S. consultants gathered in the response to the project second preliminary report need to be seriously considered by Canadian manufacturers.

> Although affordability is stressed in the project second preliminary report, Canadian manufacturers are simply not adequately sensitive to this important requirement. It should have been stressed in the report even more strongly.
>
> In my experience the propensity for the Canadian industry to innovate is close to zero; the history of foam adhesives is only one example.

Table 8:
Price per square foot, Canada and United States

	Lowest	Average	Highest
Canadian Manufacturers			
From 1994 Industry Canada Study (11 plants)	$28.37	$36.51	$45.93
From three Canadian plants	$28.37	$34.62	$38.99
U. S. Manufacturers			
From Harvard study (for 1995)		$28.53*	
From Michigan study (for 1991)		$28.51*	
From U.S. price list—single section (1998 price list)	$27.36	28.58	$29.60
From U.S. price list—multi-section (1998 price list)	$21.71	$27.60	$33.83

Notes:
Data are in C$ at an exchange rate of 1.42.
These values were based on retail prices. To determine factory door price, an assumption of a 25 per cent markup was made.

> Canadian manufacturers seem to be in a state of denial regarding the significant productivity differences between plants in the U.S. and Canada.

This point should be more fully explored and emphasized in the final project report.

Summary and comments

The response of the Canadian industry to changing market conditions appears to be inadequate or certainly less effective than the response by the U.S. industry in recent years. The use of the foam adhesives more than any other "operational matter" (over 90 per cent of U.S. plants use these materials in side wall and ceiling sub-assemblies) separates the U.S. and Canadian manufactured housing industries in a significant manner and is, very likely, a contributor to the difference in market penetration in the two countries as outlined in the first chapter of this report. The Canadian industry must return to, and reinforce, its emphasis on affordable, value housing for Canadians, including the active revitalization of the Z240 standard. The Canadian industry has, in recent years, lost some focus on this important matter relative to the U.S. industry. Indications from the study are that U.S. HUD product is 25 to 32 per cent lower priced than Z240 product at the factory door (in terms of Canadian dollars). Although manufactured homes are purchased by households with a wide range of incomes in the United States, most U.S. buyers are lower-income households (Vermeer and Louie, 1997: 16).

CHAPTER 3: IMPACT OF CODES ON PRODUCT AFFORDABILITY

While it is not possible to be exact, it is clear from a macro analyses perspective that code-driven cost differences are significant in the matter of relative affordability of manufactured homes in the United States and Canada, and this needs to be addressed in an effective and responsible manner as soon as possible.

Overview cost comparison of Z240 MH and NBC

Comparing the costs of a single mobile home (4.26 m by 21.3 m or 14 ft by 70 ft) built to Z240 MH standard and NBC indicates, from experience in Alberta, that the increase in material costs is between $300 and $1,350. The comment has been heard in Canada that because there is no great difference in material costs why not just build everything to the NBC. From an affordability perspective, this is probably an erroneous piece of reasoning. Consider the following.

- This $300 to $1,350 of extra material cost becomes $450 to $2,025[2] at the factory door to the distribution system and can eventually translate into $585 to $2,632 to the ultimate customer, the homeowner.

- The reason the material cost differences (between Z240 and NBC) are at this described low level (at least by a Canadian perspective) is because, by benign neglect, the Z240 MH standard has been allowed to become very close to the NBC in all respects structurally. These changes, at times, have exceeded basic health and safety considerations.

- Most U.S. mobile home manufacturers would consider any cost of material increase in excess of $10 per home to be significant and worthy of management action. Canadian manufacturers must have a similar outlook to ensure affordability of their product, at least for basic standard product. Even though there is little standard product built, it is still this cost base that is crucial.

The above figures of $300 and $1,350 come from discussions with engineering and management personnel of two Canadian companies. Both companies are foreign owned but have operated in Canada for a significant number of years. Both have their roots in the mobile home segment of the industry. The first of these companies does, and to a large extent, has always emphasized affordable housing. The second company takes an upscale approach to the market. The $300 figure was based on the cost the first company experienced in 1989 when Alberta required all manufactured homes to be built to the NBC and specific provincial requirements and be labelled A277. The specific figure of $300 was obtained by reviewing some simple drawings and through discussions with company personnel. This number has been reconfirmed in recent discussions with company personnel. Some details of this overview analysis are as follows.

- **Windows—$150**. At that time, there was a need to increase the quality of windows to move from Z240 to NBC and this cost amounted to approximately one half of the $300. At present, there appears to be no significant difference in the quality of windows used in Z240 and NBC homes.

- **Structural changes—$100.** These involved such requirements as changes in roof truss design, double plating in certain designs, extra studs, changes to support blocking for non-load bearing partitions, solid horizontal blocking for two stud spaces at the exterior doors, dead bolt requirements on exterior doors, etc.

- **Plumbing changes—$50**. These involved such things as the installation of water hammer preventers consisting of air chambers installed vertically that are fabricated from pieces of piping with a capped upper end or

a premanufactured unit, changed flush cycle requirements on water closets, requirement for special galvanized pan under water heater, etc.

Regarding the $1,350 estimate, the second company (with the up market approach) was asked to outline its current experience, i.e., in 1997-98, in building A277 product for Alberta and Z240 product for British Columbia. In discussions with this firm, company personnel provided the following detail.

- **Structural requirements—$520**. This includes changes to roof trusses ($100), the use of Class 2 vapour barrier ($100), other minor items such as roof venting ($20) and changes to floor members ($300). In this case, and with longitudinal steel frame member spacing of 320 cm (126 in), the company can use 5 cm by 15 cm (2x6) members under Z240 and 5 cm by 20 cm (2x8) members under NBC.

- **Plumbing requirements—$380**. This includes such items as shut-off valve requirements on all fixtures under NBC, requirements for pressure balancing in shower and bath taps, galvanized pan on which to set water heater, different venting requirements for gas water heaters, etc.

- **Insulation requirements—$300**. There is more flexibility in the determination of required insulation levels under Z240.

- **Difference in clearance to overhead cabinets around range—$150**. In this company's case, it involves increased material costs, mainly in cabinetry.

Comparison of Z240 MH and HUD 3280

Because the main thrust of this project relates to the comparison of the experience of the manufactured housing industry in Canada and the United States, it is appropriate to compare the cost implications of the differences between the HUD 3280 Code in the United States and the CAN/CSA Z240 standard in Canada. This has been done by studying summary information from two plants that are certified to produce both HUD product for the U.S. market and Z240 product for the Canadian market. There have been a number of technical code comparisons completed over recent years between HUD and Z240 which are useful and have been reviewed to assist in this comparison. However, it is not the purpose of this project to complete yet another technical comparison of the codes but rather to assess the cost implications of the actual enforcement of codes in the field. The real impact to the consumer is any extra costs associated with a Z240 unit at the factory door compared to a HUD certified home.

Consider a single-wide 4.26 m by 21.3 m (14 ft by 70 ft) mobile home from a U.S. plant which normally builds HUD product. If such a plant were to build the same product to meet the requirements of Z240, the change in cost, based on actual experience from two different U.S. plants, would average US$4,650 extra at the factory door. (One plant's charge is $4,800 and the other's is $4,500.) This is a significant amount—US$4.74 per sq ft or approximately C$6.73 per sq ft (at an exchange rate of 1.42).

This average of $4,650 includes a markup on basic increased material costs of 50 per cent. Therefore, the material cost implication of the code difference is $4,650 divided by 1.5, i.e., US$3,100. This increase in material costs is composed of the following major components based on estimates gleaned from plant observations and discussions with a number of people familiar with the U.S. industry. (While these estimates are not exact, they are relevant and reflect the situation in a realistic manner.)

- **Roof—$500.** Differences are in roof truss requirements and the use of conventional fasteners rather than foam adhesives, polyethylene rather than a paint vapour barrier, etc. The increased cost of roof trusses is the largest factor in higher costs.

- **Walls—$400**. Lumber grade, changes in sheathing, increase in mechanical fasteners, polyethylene rather than a paint vapour barrier, etc.

- **Floor—$450**. Increase in lumber grade requirements and use of 5 cm by 20 cm (2x8) members rather than 5 cm by 15 cm (2x6), the Z240 requirement for perimeter ducting.

- **Insulation—$100**. Requirement to change to an insulation product approved in Canada. This cost difference could disappear with approval of the specific insulation product in Canada.

- **Electrical and plumbing—$200**. Examples of cost differences in these areas are the use of mechanical plumbing vents in the United States and the requirement for CSA-approved electrical components in Z240.

- **Vehicular items—$100**. Brake wire and other associated matters.

- **CSA-approved items—$800**. Flashings, exterior doors, etc.

- **Other materials—$550**.

Total material increases from code differences = US$3,100.

Here is some additional information on the above cost components.

- **Roof**. The increased costs of roof trusses are caused by three code matters.
  - Snow load requirements in Canada under CSA Z240, not surprisingly, are generally more stringent than in the United States. However, this subject needs further study because there are indications that we may have some engineering overkill in Canada. Snow conditions in areas such as upstate New York, Michigan, Minnesota and some mountain states are as severe as most parts of Canada. An objective comparison of the snow load requirements in HUD and Z240 by the Z240 structural sub-committee seems to be appropriate in the proposed review of the standards. It has been pointed out by the CSA that climatic data are likely more complete in Canada than in the United States. An example of this is the fact that the U.S Uniform Building Code snow load design procedures are based on the NBC in Canada.
  - Deflection limits for testing situations (roof and floor members) are more severe in Z240, which is based on the NBC, than those outlined in the HUD requirements. This matter also deserves the attention of the Z240 structural sub-committee.
  - Under the HUD system, U.S. manufacturers tend to use trusses that come from a fabricator which has trusses tested and qualified by a HUD-approved primary inspection agency. Truss designs are not normally based on engineering analysis in the United States, but rather on tests that result in materials saving. In Canada, typically, the manufacturer buys trusses from a fabricator which has the trusses certified by a third party agency. In Canada, truss designs are almost exclusively based on engineering designs and stamped by a professional engineer. The CSA has made the point that tests can give unreliable and inconsistent results. This specific practice needs to be challenged by the industry in Canada. Surely a performance approach to codes and standards is what the manufactured housing industry is all about. The present truss approach in Canada significantly affects the affordability of the final product and is likely contributing, to some extent, to the difference in market penetration in Canada and the United States.

- Floor structure. The increased costs of the floor are caused by one significant code matter. Although the design load

requirements in HUD and Z240 are very similar, deflection limits for testing situations (roof and floor members) are more severe in Z240 than those outlined in the HUD requirements. This results in the use of 5 cm by 20 cm (2x8) rather than 5 cm by 15 cm (2x6) normal in a 4.26 m (14 ft) wide product built to the HUD Code in a typical floor structure. This increases the cost of the product. This matter also needs to be reviewed in a responsible and objective manner by the Z240 structural sub-committee. Certainly, floor design load factors are driven in a significant manner by considerations of vibration, and this must continue to be considered in a review of these deflection criteria.

In response to the request for more detail (i.e., CSA Z240 compared to HUD 3280), the following is an attempt to provide some additional information to assist in the revitalization of the Z240 standards.

The approach taken during this part of the investigation, i.e., cost implications of Z240 compared to HUD 3280, was to determine from a plant level, the actual cost differences experienced in the field between Z240 product and HUD product. In some of the early plant visits to Western Canada, confusing signals were received that indicated that it was costing some Canadian plants more to build HUD product than Z240 product. It quickly became evident that an assessment of a U.S. plant building both HUD and Z240 product had to be carried out and this was done. The major code-related cost differences have been identified above. During this part of the work, a number of code comparison studies were read and utilized. These include Yee (1992), W2 Consultants (1989), Scanada (1994) and Le (1990).

While the above reports were very helpful, it was difficult, if not impossible, to use them alone to determine major code-related cost differences. It was necessary to obtain actual invoices (where possible), visit a U.S. plant and hold a number of discussions with people on both sides of the border to obtain the figures shown above. Obtaining this information required diplomacy, understanding of the production processes in the industry and a good deal of judgment based on industry experience. Simply put, the information on this subject was not easy to obtain but is meaningful and can be used to effectively assess the cost implications of the differences between HUD 3280 and Z240 standards.

Overall assessments of the quality of the HUD Code relative to other building codes in the United States are difficult to perform because the codes are complex. In a 1993 report from the University of Michigan (Warner and Johnson, 1993), researchers compared HUD and BOCA (Building Officials Conference of America) requirements and found that HUD standards were less demanding in some areas and more demanding in others. For example, the report states minimum ceiling heights, hallway widths and thermal protection levels in the HUD Code were less restrictive than the BOCA requirements in Michigan, while fire safety requirements for ceilings and furnaces, exterior exit facilities and wind load requirements were more restrictive. In an effort to quantify differences between codes, the National Commission on Manufactured Housing in the United States compared material costs for units built to minimum HUD and BOCA standards. This study concluded, at the time the comparison was carried out (1993), that the HUD Code granted material cost savings of almost 12 per cent. Such comparisons are complicated further by the fact that the HUD Code is fundamentally different from the other codes. Standards in the HUD Code are generally performance based which should be an objective in the revitalization of the CSA Z240 standards.

Building product in Canada for the U.S. market

With the exchange rate on the Canadian dollar, some Canadian manufacturers are, understandably, exploring building homes for the U.S. market. Most Canadian manufacturers

which have explored or are indeed building HUD Code product for the U.S. market report that their HUD product costs more to produce than Z240 MH product. It appears that these plants are essentially building Z240 units plus any changes required by the HUD system. Material cost advantages of the HUD Code are, in the main, not being realized by Canadian manufacturers because of the relatively low number of units exported to the United States. A re-engineering of the product for the U.S. market is not considered economically feasible by these Canadian manufacturers which are mostly located in the Maritime provinces. At least three Canadian manufacturers located in the Maritimes are successfully exporting HUD-certified product into the New England area of the United States (approximately five to 10 per cent of their production). These Maritime manufacturers are having notable success in the New England area. They market the concept that Canadian product is structurally stronger and better. In other words, with some Canadian ingenuity, they use the higher requirements of the Z240 standard compared to the HUD code as a marketing tool.

Attempts by Western Canadian manufacturers to build mobile homes to the HUD standard for export to the United States have generally been unsuccessful. This appears to relate more to inadequate marketing rather than code matters.

Some manufacturers in Western Canada are building a small amount of product for the U.S. market, mainly Montana. The companies which are doing this with some success are building the product to the Uniform Building Code, not NBC, and not HUD 3280. Some Maritime manufacturers are also exporting modular homes to the U.S. market with success.

Summary and comments

Indications from a University of Michigan study (Warner and Johnson, 1993) are that HUD product in the United States enjoyed a 12 per cent material cost advantage over site-built housing in that country in 1994.

A simple comparative study of product built in U.S. plants to both HUD Code and Z240 standards indicates that there is a material cost difference of some US$3,100 between a typical 4.26 m by 21.3 m (14 ft by 70 ft) HUD Code product and product built to Z240 standards for sale in Ontario. These numbers indicate that the Z240 products are priced higher by some US$4,650 i.e., C$6,620. In percentage terms, the code-driven cost differences give rise to an increase in the factory price of some 23.6 per cent. The range is likely 20 to 25 per cent over a series of different floor plans. In summary, the indicated percentage factory price difference between U.S. HUD Code product and Z240 product is 25 to 32 per cent as shown in Chapter 2 of this report; 80 per cent of the difference appears to be code related.

CHAPTER 4: HISTORICAL AND POLITICAL IMPACTS OF CODES

At one time in the early 1970s, the Canadian manufactured housing industry was ahead of the U.S. industry in national code development which is fundamental to the ongoing viability of the industry. Unfortunately, this is no longer the case and the Canadian industry must take a proactive approach to the revitalization of the CSA Z240 standards.

The Canadian scene

Under the *British North America Act* and its successor the Constitution Act, responsibility for building regulations in Canada rests with the provinces and territories. In the past, this responsibility was generally delegated to municipalities. Not surprisingly, a multiplicity of regulations developed as each municipality tried to deal with its own needs. These variations from one municipality to the next made it very difficult for designers, product manufacturers and contractors to conduct business in more than one region.

Therefore, in 1937, the Department of Finance in Canada asked the National Research Council (NRC) to develop a model building regulation that could be adopted by all municipalities in Canada. The result was the publication of the 1941 National Building Code.

The postwar construction boom resulted in demand for a revised NBC. Therefore, in 1948, the NRC created the Associate Committee on the National Building Code to update and maintain the document and to provide for broader input to the changes and maintenance to the NBC. The Associate Committee revised the NBC in 1953 and has published new versions approximately every five years since that time. The NBC 1995 is the 11th edition.

In 1956, the NRC created the Associate Committee on the National Fire Code which produced the first edition of the National Fire Code in 1963. The two committees were disbanded in October 1991 and replaced by the Canadian Commission on Building and Fire Codes (CCBFC).

The Commission is aided in its work by standing committees that are responsible for the technical content of various parts of the codes. For example, the Standing Committee on Houses is responsible for Part Nine of the NBC. This standing committee has the most impact on the manufactured housing industry and all housing for that matter. Since the early 1980s, there has usually been some manufactured housing representation on this committee. At present, the executive director of the CMHI is a member of the Standing Committee on Houses. In Canada, the standard known as CSA Z240—MH Series is one of several hundred product standards developed and published by the CSA, a nationally accredited, private standards writing organization and certification agency. (The CSA is a not-for-profit, independent, private sector organization that serves the public, governments and business as a forum for national consensus in the development of standards, and offers them certification, testing and related services.)

The Z240 MH series of standards had its inception in 1968 when the Canadian mobile home industry and some provincial regulatory authorities saw the need for a national standard for mobile homes having characteristics such as transportable sections and use of factory manufacturing techniques that regular building codes might not address. Indeed, they did not and still do not. This set the tone for long-standing differences in the point of view adopted by various segments regarding building codes.

Regulatory view: This view basically makes the point that there should be only one national housing code for all housing in Canada, and there is no way that an industry like the mobile home or manufactured housing industry should get special treatment. Certainly, no one industry should go

off by itself and develop its own building code. In recent times, this view had sufficient influence to lead to a substantial effort to harmonize the Z240 MH Structural Standard with the NBC. (In recent years, the Part Nine Standing Committee has been moving toward an objective-based housing code, and these real efforts will likely be reflected in the 12th edition of the NBC.)

Mobile home manufacturers' view: This view strongly believes that the manufactured housing industry requires a standard that is designed specifically for the unique needs of an industry that manufactures, rather than site builds. The Z240 MH series of standards was originally developed for those needs and came from the traditional mobile home industry. According to this view, the manufactured housing industry must always have a stand-alone set of standards that take into proper account the manner in which homes are built on an assembly line in a factory. Such a unique standards development process allows for, and fully recognizes, the continuing need for an emphasis on housing affordability. (This particular school of thought in the United States is a major reason for the successful and effective development of manufactured housing code HUD 8240, which is essentially a performance-oriented code, an important reason for greater market penetration of manufactured housing in the U.S. housing market compared to Canada.)

Modular manufacturers' view: Traditional modular home manufacturers in Canada were, in the main, site builders wanting the advantage of a controlled climate of a factory, thereby obviating some of the problems that unfriendly weather conditions present to housebuilders in Canada. In regard to building codes or standards, traditional modular home manufacturers in Canada fully accepted, at least originally and, to a large extent, still do, that the modular home product must comply with NBC and provincial codes. They did not necessarily wish to support a specific set of standards sensitive to the special needs of a factory environment. These manufacturers had their product certified by the CSA as complying with the NBC and provincial building codes in accordance with the procedure that is specified in a separate CSA Standard, A277 "Procedure for Certification of Factory Built Homes" (first published in 1972). In the United States, modular homebuilders build to a series of local or regional codes, e.g., BOCA, CABO (Council of American Building Officials) and the Uniform Building Code. There is no nationally recognized building code in the United States equivalent to the NBC.

All the above views have a legitimate case to make and they certainly continue to be made. In a very typical Canadian consensus approach in the late 1960s, with the help and cooperation of a lot of people from the NRC, CMHC, provincial building authorities and others, the Z240 MH series of standards was developed and implemented in the early 1970s, a time of noteworthy success for the mobile home industry in Canada (see Table 2). It is also noteworthy that of the 49 Canadian manufactured home plants listed by the CSA as producing certified product (as of March 1997), 25 are certified for both Z240 MH and NBC/provincial codes. Almost all the larger volume manufacturers are certified for both standards. These factories continue to recognize the need and importance of the Z240 MH series of standards.

A national standard was desired so mobile homes built to the same minimum standard in one province would not likely be rejected when shipped to, and located in, another province or territory which had adopted the same standards. There was at that time, and still is, a strong need to provide affordable housing for Canadians; mobile homes and all factory-built homes have the capability to provide a good portion of the need for affordable housing in Canada. The concern for consumer protection, ease of interprovincial trade, cost effectiveness and utilizing one set of standards dealing with safety and health instead of many local and conflicting sets, underlined the need for a national standard. The CSA was approached by the mobile home industry and some provincial regulatory authorities because of the CSA's recognized committee structure and the consensus principle followed in national standards development.

In encouraging the use of the Z240 standards, the mobile home industry also requested the CSA to operate a voluntary certification program to check for compliance to the Z240 MH standards, and to label such homes that comply to the Z240 MH standards, in accordance with the procedure that is specified in the separate CSA Standard, A277 "Procedure for Certification of Factory Built Homes" (first published in 1972).

The Z240 certification provides assurances of home safety and durability, and has been, over the years, widely accepted. Federal and provincial housing agencies, such as CMHC, have at various times, stipulated that the homes must comply with the CSA Z240 MH standards in order to obtain mortgages insured under the *National Housing Act* or provincial housing acts.

Over the years, many provincial regulatory bodies have adopted the Z240 MH series of standards for manufactured housing in their regulations or provincial building codes. However, there is growing confusion among provinces. In recent years, the Z240 MH standards have been less acceptable to some provincial building authorities. Several provinces have expressed concern over the continuing existence of two applicable building standards for homes (i.e., Z240 and the NBC). The authorities in Alberta, in about 1989, mandated CAN/CSA A277-90 (which required building to the NBC/provincial requirements) for all manufactured housing in order to comply with the Alberta Building Code. On the other hand, British Columbia, right next door, states in its provincial building code that homes conforming to the CSA Z240 MH are exempt from the British Columbia Building Code. This situation appears to be leading to difficulties with products being shipped across these provincial boundaries and, ultimately, increases confusion and costs to the consumer. This action by the Alberta government considerably weakened the image of the Z240 MH standards as a national standard and is regrettable from an industry perspective. The intention from the beginning was that the Z240 label was to be the nationally recognized standard and label for mobile home products, and A277 labels were to be used to indicate certification of modular homes built to the NBC/provincial regulations. The decision of Alberta officials was, undoubtedly, based on sound analysis from their perspective but it is causing confusion and requires review and discussion between the industry and the Alberta Department of Labour.

Industry confusion and debate caused by the code harmonization thrust

The confusion regarding Z240 MH standards mentioned above was certainly increased during the last two or three years when a formal activity was initiated to harmonize Z240 MH and the NBC by the CSA Technical Committee on Factory Built Houses. This created serious concern among mobile home manufacturers, and objections to this harmonization activity were expressed during the first quarter of 1996 by the president of the MHI Canada, the newest trade association for the manufactured housing industry in Canada.

There is some history associated with this code harmonization thrust which, in the interests of completeness and fairness, needs to be recorded in this document. Early in 1996, at an annual meeting of the CMHI in Halifax, the executive director lost his position, in part, because of a good deal of confusion and misunderstanding about the thrust to harmonize Z240 with the NBC. (This confusion is apparent in some correspondence of the time). In early 1996, a number of manufacturers expressed serious concern about this harmonization thrust. The point was made that the harmonization was, in fact, a move to adopt the NBC, and this would leave the mobile home segment of the industry with little or no control over the destiny of Z240 product. In the United States, the pattern of such harmonization thrusts tended to mean adoption of a local building code which is essentially controlled completely by regulatory authorities. (The HUD Code is an exception to this approach). While there were CMHI manufacturers (mainly modular home manufacturers) with no objection to the code harmonization activity of the CMHI, a significant number of CMHI manufacturers were concerned. Indeed, this concern led to significant changes within the CMHI.

One of the first things the present executive director of the CMHI did after his appointment in mid-1996 was to chair a telephone conference call of Z240 manufacturers. He felt strongly that he had to obtain industry consensus on the issue of Z240 harmonization with the NBC and take appropriate action. The conference call was brief and the conclusions were unanimous: the industry strongly supported a stand-alone document for mobile homes. These homes should not be any less healthy and safe than site-built homes.

Shortly after the conference call, because of rumblings that another province was considering following Alberta to not reference the Z240 standard, The CMHI executive director requested an opportunity to make a presentation on behalf of the industry to the Provincial and Territorial Committee on Building Codes and Standards (PTCBS). He presented to the PTCBS the following:

In a recent conference call with Z240 producers on the future direction for the CSA Z240 Standard the following was concluded:

- Z240 has provided an important role for the industry that could not be provided solely by the National or Provincial Codes and consequently should be retained.
- Z240 should be expanded to be a true stand alone document.
- Z240 needs to be referenced in the National Building Code and every Province and Territory.
- Z240 should be modified as required to provide health and safety standards equivalent to that of a similar NBC house.

All members of the PTCBS present at the meeting supported the CMHI presentation and proposals, including the province of Alberta.

The question of "health and safety" plus subsequent inter-industry politics then put the Z240 project on hold from a CMHI perspective. Health and safety became a major point of difference among manufacturers: by continuing to accept the objective of health and safety harmonization with the NBC, the Z240 standard would become merely a subset of the NBC, and the industry would lose control of a standard that most companies still engaged in the mobile home industry believed was essential to the survival and growth of their market segment.

Meanwhile, the CSA Technical Committee on Factory Built Houses was continuing with the code harmonization thrust that had caused the original dispute and confusion in 1996. (Remember, it played a major role in the previous executive director of the CMHI losing his job.) This created widespread alarm among mobile home manufacturers, and objections to this harmonization activity were expressed more strongly during the last quarter of 1996 by the president of MHI Canada. He was supported in this effort by proxy votes of 12 manufacturers, involving 14 plants. Manufacturers from both associations gave a proxy to the president of MHI Canada and the harmonization thrust was essentially stopped. Although it was embarrassing to the industry in its relations with the NRC and not everyone in the industry will necessarily agree, the president of MHI Canada felt he had no choice but to voice the serious concerns that he did because these were genuine issues expressed to him by a number of manufacturers. The serious implications of proceeding along the code harmonization path which did not have the support of many of the manufacturers in both ends of the country are obvious. In fact, eventually, this unfortunate but necessary dispute led to the establishment of the project for which this report is being written.

One Alberta manufacturer reported in a telephone conversation that he does not build Z240 product because he cannot sell this product in today's market. However, in visits to 11 Canadian manufacturers (from British Columbia to the Maritimes) there was not one manufacturer who did not agree that the retention of the Z240 MH standards is required. There are certainly differences between eastern and western manufacturers regarding the approach to achieving this objective, i.e., retention of Z240, but these differences are tactical as opposed to

strategic. Some manufacturers, particularly in the east, would like to see an effective attempt to reference the Z240 standards in the NBC and yet retain the Z240 standards within the CSA standards process, i.e., a CSA stand-alone standard that has equivalency with the NBC.

An existing point of concern with many members of the Canadian manufactured housing industry is that there is a gradual de-emphasizing of importance (certainly a decline in importance) and acceptance of CSA Z240 MH standards. This is correctly viewed as a serious threat to the future of the affordable traditional mobile home market segment. For example, code review and activity of the very important CSA Z240 MH series of standards for mobile homes has been virtually non-existent since 1992. The last major activity was the development of Z240.0.10.1 "Site Preparation" in 1994. The CSA is overdue for a review of the Z240 standards. Quoting from a CSA Z240 (MH Series-92, Oct. 1992) document: "It is planned to issue new additions of these standards, regardless of the amount of revision, at intervals not greater than five years." The industry must take a very proactive approach to this situation with the CSA and get the review under way as soon as possible.

There is a perception in the industry that there is a lack of interest on the part of the CSA as an organization toward the Z240 MH standards. CSA personnel have recently stated that this is definitely not the case. However, these same CSA personnel point out that there are real economic reasons for the CSA's reduced role in Z240 activities. The CSA, like many such organizations, is under economic pressure regarding the availability of resources. It is clear that the Canadian manufactured housing industry has been remiss in not retaining essential and effective communications regarding the Z240 MH series of standards.

There is a long history of an effective and responsible relationship between the CSA and the Canadian industry going back to the late 1960s with the Z240 program. It is absolutely essential that this important relationship be "reinvigorated" for the sake of the industry, regulatory authorities and, most important, to the Canadian consumer. A good start would be for the industry to forcefully and effectively man the Z240 committees with competent industry people consistent with committee composition requirements of the CSA. The CSA cannot be held totally responsible for the decline of importance of the Z240 MH series of standards. The Canadian manufactured housing industry must accept the bulk of the responsibility for the unsatisfactory situation in regard to the Z240 MH series of standards. It also seems appropriate that the chairmanship of the CSA Steering Committee on Factory Built Homes and the CSA Technical Committee on Factory Built Houses should be from the industry or, at the very least, be completely familiar with the business and technical challenges faced by the manufactured housing industry in Canada.

Many of the problems outlined here regarding the Z240 standards and the harmonization thrust are, unfortunately, still evident in the Canadian industry today. In fact, this situation has made it difficult for the author of this report to sort out fact from fiction. It has often been stated during the project that a certain position is merely a perception, implying that it is not true or fact. However, it can never be forgotten that perception is reality in the eyes of the perceiver and a good deal of sensitivity and understanding on the part of all parties will be required to heal the emotional scars caused by this whole code harmonization thrust. The industry has created, or rather permitted, an unbelievable level of political activity during the last three years. While political activity in and of itself is not all bad (it is in fact a reality of life), much of this political activity observed in the industry is cancerous or destructive. It is time for a number of people in the industry to put down their swords and engage in more activities pointed to "doing the right thing for the industry" and much less trying to prove "who is right" or "was right." At the round table session of June 12–13 involving Canadian manufacturers, there were strong indications that the Canadian industry is in a mood for cooperative effort in the best interests of the industry.

A possible solution to the code dilemma

At an April 2, 1998 meeting of the Project Advisory Committee, a sincere effort to put in place the first steps of a proposal to break this code log jam for the mobile home manufacturers was discussed. The essentials of this proposal are outlined below.

- The issue of CSA Z240 and the NBC has been on the table for a number of years. The NRC has stated that it is time to look at the challenge of code reconciliation with fresh eyes.
- There is now acceptance by the NRC and other regulatory people that the mobile home industry requires a separate code structure that reflects sensitivity to the needs of plant manufacturing methods and the industry's mission of providing affordable housing.
- In turn, the mobile home industry must recognize the credibility of the NBC within Canada and the world. To proceed with the revitalization of Z240 in a manner that is oblivious to the present activities of the Part Nine Standing Committee and the importance of the NBC on the national scene and among provincial building authorities (specifically the PTCBS) would be imprudent.
- Accepting that the mobile home industry must revitalize the Z240 standards in order to survive, it is in everyone's best interest to have a stand-alone mobile home code that is constantly striving to achieve and maintain equivalency to the NBC which is going through significant change. This could ultimately lead to the referencing of the Z240 standards in the NBC, and this is certainly desirable from an industry perspective.
- It is fully recognized and accepted that this proposed effort toward code equivalency also includes possible reductions in the requirements of Part Nine of the NBC.
- While the sincere efforts of the industry and regulatory authorities to achieve equivalency are going forward, the Z240 standards will be revitalized. If the equivalency efforts fail, for whatever reason, then the mobile home industry has lost nothing because the Z240 standards will still exist and will have been subjected to a needed revitalization effort. Such an approach should result in a win-win situation.

The U.S. situation

The history of the mobile home standard in the United States goes back further, to 1940 when the first standard was adopted by the Committee on Trailers and Trailer Camps of the National Fire Protection Association (NFPA).

Some states had their own laws governing construction of homes and transportation on their highways as the trailers increased in size from 2.4 m (8 ft) wide to 3 m (10 ft) wide, then 3.7 m (12 ft) and wider, and the structures were used more as homes. In many cases, the NFPA 501B/ANSI A119.1 Standard was adopted and referenced.

The next major change came in 1974 when the U.S. Congress enacted the *National Manufactured Housing Construction and Safety Standards* Act and declared, "the purposes are to reduce the number of personal injuries and deaths, and the amount of insurance costs and property damage resulting from manufactured home accidents, and also to improve the quality and durability of manufactured homes" (Section 602).

The Congress, by this Act, authorized the Secretary of Housing and Urban Development (HUD), a federal agency, to establish and amend federal manufactured home construction and safety standards. These standards supersede any state or local standards which are not identical to the federal standards, unless they deal with issues such as manufacturers' warranties not addressed in federal standards. The federal standards are also referred to as the HUD standards. It should be noted that the situation in the United States is constitutionally different than in Canada when it comes to manufactured housing standards. Congress usurped the individual state's authority

with the passing of the *National Manufactured Housing Construction and Safety Standards Act* of 1974. Such legislative action is simply not constitutionally possible in Canada.

The Act also authorizes the secretary to conduct inspections necessary to enforce the standards, to determine if a home fails to comply or contains defects, and to require the manufacturer to notify owners about and to remedy those defects. All these implementation procedures form the HUD enforcement regulations. The U.S. program is mandatory and firmly backed by federal law. In general, manufacturers in the United States face a system that involves more agencies and obligations than one-third party certification offered by one agency, like the CSA in Canada. However, U.S. manufacturers "self-certificate" the homes built and use HUD-approved third-party organizations—design approval inspection agencies (DAPIAs) and production inspection primary inspection agencies (IPIAs). Often, two different organizations are used for these distinct requirements (design certification and production inspection). However, some HUD-approved organizations can perform both services. There is strong evidence that the plant inspection activities are much more frequent in U.S. plants than in Canadian plants Essentially, in U.S. plants, every home is inspected at some stage of construction on the assembly line by the appropriate IPIA. The U.S. industry strongly supports the HUD Code, and most U.S. manufacturers strongly believe that the one nationally accepted code is a key reason for their continued success in the U.S. housing market. Therefore, they are prepared to accept the costs of one or two outside agencies to give credibility to the HUD program. To put it very simply, it is in the manufacturers' interest to maintain the integrity of the HUD program. As one industry representative put it, "They appear to be putting their money where their mouth is."

Summary and comments

The activity of the Canadian industry to maintain an effective national CSA Z240 program is inadequate for the present market environment and the present attitudes of provincial building authorities. The U.S. industry support of the HUD program is a major reason for continuing national acceptance and successful market penetration of manufactured homes in that country.

In the early 1970s, the Canadian manufactured housing industry was ahead of the U.S. industry in national code development which is critical for the ongoing viability of the industry. Unfortunately, this is no longer the case.

It is time to stand back and learn from the U.S. experiences that apply to the Canadian situation. It is essential that the industry give high priority and aggressively work with CSA and regulatory authorities to revitalize the essential CSA Z240 program. During this revitalization, an objective assessment of the differences between Z240 and HUD must be carried out.

It is also essential that the revitalization of Z240 include, as much as possible, a careful consideration of the present work being carried out by the Part Nine Standing Committee on Houses including a commitment by industry to strive for equivalency with the NBC. The objective of this equivalency thrust is in the interest of the Canadian industry leading to the desired referencing of CSA Z240 in the NBC.

CHAPTER 5: THE Z240 TASK FORCE: THE ALLIANCE FOR AFFORDABLE HOUSING

There was some discussions during the project meetings about using a different name for the Z240 task force. One suggestion was The Alliance for Affordable Housing. This seems to be an appropriate name for this important task force.

The work completed on the project (outlined in Chapter 3 of this report) has identified specific code differences that have or could have significant impact on the affordability of the product. The CMHI has engaged the Ottawa-based engineering firm of Morrison Hershfield to assist in the review of structural code matters, and this work should be used by the Z240 task force. The ultimate action on detailed code matters must be taken by the proposed Z240 task force and the Z240 technical committee(s). The Z240 code revitalization is the responsibility of the industry as a whole working in a cooperative manner with all interested stakeholders, including regulatory authorities. A number of technical matters will need to be addressed in the recommended revitalization of the Z240 program in the interests of product affordability.

Snow loads

HUD

Under the HUD requirements, there are three design load zones:

- North Zone—The states of Maine and Alaska in which the design roof (snow) load is 40 psf.
- Middle Zone—Midwest, New England and some western mountainous states (Montana, Idaho, Utah and Colorado) in which the roof load is 30 psf.
- South Zone—All other areas of the United States in which the minimum design load is 20 psf.

CSA—4.2.3 of Z240.2.1

For units less than 4.9 m (16 ft) wide, the design snow load shall be the greater of 40 psf and 50 per cent of the ground snow load for the location intended. For units greater than 4.9 m (16 ft) wide, the load shall be the greater of 60 per cent of the ground snow load for the location intended and 20 psf. In general, CSA requirements are more stringent because of the Canadian northern climate. It is recommended, as stated in the preliminary report, that this matter be reviewed by the Z240 Task Force.

Deflection limits

Table 9 shows the difference between the two codes in regard to deflection limits.

Table 9:
Deflection limits, Canada and United States

	Z240 MH	HUD 3280
Bedroom floor	L / 240	L / 240
Other than bedroom floor	L / 360	L / 240
Room—other than plaster	L / 240	L / 180
Roof with plaster	L / 360	L / 180
Truss < 4.3 metres (no plaster)	L / 180	
Truss > 4.3 metres (no plaster)	L / 240	
Sub floor (between joists)	3 mm (0.118 in)	1/8 in

Note: Other than for the bedroom floor, Z240 has more stringent deflection requirements than the HUD code. This has cost implications that need to be assessed in revitalizing the Z240 program. Also, there always has been a provision in the NBC to allow for empirical acceptance based on field experience and this needs to be encouraged in the enforcement of Z240. Theoretical calculations are not the only option.

Trusses

This subject relates more to code enforcement and different industry practice in the two countries rather than actual differences in the two codes. This is best illustrated by the following quotations from Patrick Yee's (1992) report.

HUD
According to one industry representative, "Typically, the manufacturer buys trusses from a fabricator who has the trusses tested and qualified by a HUD approved primary inspection agency. Truss designs are not normally based on engineering analysis, but rather on tests that will result in materials savings."

CSA
As one industry representative said, "Typically, the manufacturers buy trusses from a fabricator who has the trusses certified by a third party agency (acceptable to the CSA). Truss designs are almost exclusively based on engineering designs and stamped by a professional engineer, and not on tests which can give unreliable and inconsistent results." It must be noted that the NBC provides for the acceptance of tested trusses and this option should be open to the manufactured housing industry in Canada.

This difference in practice, coupled with different snow load requirements, results in a large cost differential. For example, in one U.S. plant, the increased cost was US$4 (C$5.68) per truss for a Z240 product compared to a HUD product.

Lumber grade

Under Z240 for floor, roof and ceiling framing, the grades of lumber used must conform to those determined by test or engineering analysis. Under HUD, all dimension and board lumber shall not exceed 19 per cent moisture content at installation. In the U.S. plant that was visited, certain pieces of lumber had to be upgraded to No. 1 grade from No. 2 in the production of Z240 product compared to HUD product.

Lintels

The Z240 requirements for lintel sizing are very similar to that required in the NBC. On the other hand, the HUD Code allows lintel sizing based on an allowable deflection of L/180. This may result in a decrease in costs. This subject warrants further study by the Z240 structural committee.

Cantilever length

Because the HUD Code allows a deflection criteria of 2L/180, this subject requires further study.

Plumbing vents

In the United States, mechanical venting devices (anti-siphon trap vents) are permitted on manufactured homes built to the HUD Code. The cost implication is that the increased charge on a Z240 product built in a U.S. plant is US$25 (C$35). The device replaces any secondary plumbing vent protecting the traps of kitchen sinks, bathroom basins, tubs, showers, washing machines, etc.

Under HUD, an anti-siphon trap vent may be used as a secondary vent system for fixtures under certain conditions. A primary vent stack must be used to vent the toilet drain. Under Z240, the anti-siphon trap vent is not referenced in the plumbing standard and therefore the CSA does not allow its use. There is sufficient evidence from the field that these devices work very effectively and should be allowed in all housing in Canada as soon as possible.

Heat ducts

Under HUD, the need for perimeter ducting is not required as it is in Canada under Z240. With the increased window quality in recent years and generally higher insulation levels, the need for perimeter ducting has been questioned by a number of manufacturers.

Electrical codes

Patrick Yee (1992) uses about four pages in his report to outline the important differences in requirements under the HUD Code and the Canadian Electrical Code. There may well be some electrical cost differences between the two countries because of the more extensive use of plastic boxes in the United States. However, this comment is based on observations during one plant visit, and the subject has certainly not been studied.

CHAPTER 6: EXPORT MARKETS AND INDUSTRY ASSOCIATIONS

In the process of thinking big, the Canadian industry must not forget its roots, i.e., affordable housing for Canadians.

In recent years, the emphasis on export markets within the Canadian industry has led to some difficulties. While exporting is economically attractive and can be commercially sound, it requires a different set of core competencies than those possessed by many traditional Canadian manufactured housing companies and their plants. In listening to experiences about the export market during the tours related to this project, one gradually gets an impression that the Canadian industry has had few solid profitable experiences in the export business. Having stated that, it must be fully recognized that export business requires a long-term view and much of the export effort to date has not paid off in significant profits. While a long-term strategy is certainly important to any business enterprise, a basic principle that must never be forgotten in strategic planning is that if you do not pay attention to the short term, you may not have a long term to worry about. To some extent, the Canadian industry fell into this trap during the 1990s.

This focus on export has resulted in less than required emphasis on providing affordable housing for the domestic market. It is very likely that this has hurt the Canadian industry in recent years relative to the U.S. experience. A review of the situation in Texas is interesting. A few years ago manufacturers in Texas were looking to the passing of the NAFTA agreement as a tremendous market opportunity in Mexico. After a number of months (even years), the industry turned its focus back on its domestic market. Since 1993, the number of plants in Texas has grown from 15 to 38. During 1997, Texas was the number one state in manufactured home shipments (37,154 homes—10.5 per cent of total U.S. shipments) and second in production (44,039 homes—12.5 per cent of total U.S. production). Texas refocussed on its own market and stressed affordability with significant success. There is an argument to be made that focussing on Texas as a model for Canada is not appropriate. Some manufacturers in Texas have pointed out that the emphasis on Mexico was not the only problem in the early 1990s, but that the domestic market had declined at that time because of general economic conditions. However, the Texas experience may, or should, be cause for reflection by the Canadian industry.

This subject of export market activity is controversial and has led, to some extent at least, to the existence of two industry associations in Canada (CMHI and MHI Canada) at a time when the industry can ill afford to be divided. In a very legitimate response to the criticism of too much emphasis on export markets at the expense of domestic markets, the CMHI, in recent years, has separated activities into three self-funded councils: the Export Council, the Z240 Council and the A277 Council (modelled somewhat on the U.S. National Home Builders Association council structure—Building Systems Council, Modular Home Council, etc.). While manufacturers in Eastern and Central Canada would not agree, a number of manufacturers in Western Canada have expressed the view that these actions, while in the right direction, "are too little too late." It is important for all to be aware that there is general consensus among all manufacturers interviewed during this project, both in the West and in the East, that the CMHI was indeed focussing, in past years, too much of its resources and efforts on export markets.

Although fraught with political risk, it is still appropriate and necessary to make some observations about the lack of one strong Canadian industry association supported by active provincial associations.

- U.S. manufacturers have a very strong and effective national association (MHI) which together with a nationally recognized code (HUD 3280) provides the basis for effective and responsible growth for the manufactured housing industry in the United States.

- The industry desperately needs one strong national voice. In arriving at the correct solution to the need for a single national association, the pertinent decision makers must not forget that it is not who is right that is important, but rather what is right that really counts. This is easy to say and tough to do but do it the industry must. It is an important part of the much needed revitalization of the manufactured housing industry in Canada.

During work on this project, a point was made by some industry stakeholders that perhaps there should be two associations: one representing what is perceived to be the traditional mobile home manufacturers and the other representing modular home builders and all other forms of manufactured housing, including panelized homes. There certainly is a pattern of this approach in the United States. The MHI in the United States, after all, came from the traditional mobile home industry. The HUD legislation essentially applied the term "manufactured housing" to the product produced by traditional mobile home manufacturers.

Although this is strictly a matter for Canadian manufacturers and other industry stakeholders to decide, from an economic and business perspective, it is doubtful that the relatively small manufactured housing industry in Canada can afford to support two associations and have an effective long-term voice.

It is encouraging to note that during the project round table session of manufacturers (June 12-13, 1998) there was a good deal of cooperation between the two industry associations and this has continued. The cooperation of MHI Canada and the CMHI in preparing the environment for the Z240 task force is particularly noteworthy. All industry stakeholders are encouraged to facilitate this increasing spirit of cooperation. In fact the concept of an alliance for affordable housing in Canada could be the foundation of ongoing cooperation and harmony within the industry.

The recent spirit of industry cooperation shown at the manufacturers' round table session on the subject of association merger is best exemplified by the following quotation from the notes of the meeting.

> Guy Johnson recommended that these activities (i.e. form one association) of the plan of action be changed to indicate that the two associations will continue to work cooperatively on the plan of action. Any forced or premature merger of the two associations would be a mistake. His basic and very valid point was that this merger should happen naturally; in fact there were signs at the meeting that this indeed may already be starting to happen.

Summary and comments

The Canadian industry must return to, and reinforce, its emphasis and commitment to affordable and value housing for Canadians. The need for one strong national industry association is an important part of the needed revitalization of the manufactured housing industry in Canada.

CHAPTER 7: THE DISTRIBUTION SYSTEM AND CUSTOMER EXPECTATIONS

The market has changed for the manufactured housing industry in Canada, and these changes are proving to be challenging, indeed difficult for the Canadian industry.

The traditional mobile home dealer network

In years past, there was a reasonably strong mobile home dealer network in most parts of Canada that contributed to the successful sale of mobile homes in the country. Dealers with their approved and significant wholesale financing plans to support adequate display lot inventories provided an important economic facility which allowed the manufacturers to produce product in an efficient manner in the plant.

The wholesale financing available to the financially strong dealers made it possible for these same dealers to place orders with the factory in a planned and orderly manner consistent with the market requirements of their particular area or areas. This in turn, allowed manufacturers to schedule longer production runs in the plant, resulting in efficiencies for assembly lines. Basically, the manufacturers gained the advantage of long-established cost reduction efforts from the "learning curve" phenomena and planned material purchasing. Many Canadian plants were able to have long production runs, hold costs down, and make significant contributions to the supply of affordable housing in Canada.

Unfortunately, the dealer network has been reduced significantly in Canada, in recent years, and this has put increased cost pressure back on the factories. The remaining mobile home dealer network in Canada must be included in any formal activity to revitalize the manufactured housing industry in Canada. The dealers are still important and are likely to remain an important part of the supply chain in Canada. Although the dealer network in the United States has reduced in size as well, it remains an important and effective component of the manufactured housing industry in that country. A more detailed examination or study of the difference in the present distribution system between Canada and the United States could be of assistance to the industry in Canada. A pattern of vertical integration is becoming more evident in the United States. Based on history, this is probably not the way to go for Canada but it needs to be examined in the proposed distribution study.

In visits to British Columbia, the question was often asked: What effect does the proximity tomarket (factory location versus population/distribution/density) have on the cost of homes in the United States and Canada? Certainly, this question is very important from a tactical perspective.

However, it is better studied and answered by the marketing and business planners for individual firms rather than on an industry-wide basis. Strategically, the geography or population density of the two countries has not changed significantly in the last 10 years, but the market penetration of manufactured housing in the two countries is measurably different as indicated by figures 2 and 3 in this report.

An added point of interest regarding the important subject of proximity to market is the matter of Elkhart, Indiana (a border state) which was always known as the mecca of mobile homes in the United States. Indiana is still a significant producer of manufactured housing. In September 1997, there were 34 manufactured housing plants in Indiana (third behind Alabama which had 40 and Texas with 38). Indiana has 11.8 per cent of the manufactured home plants in the United States and consumes 2.5 per cent of the total U.S. shipments. While the Indiana "in state" shipments of 8,913 in 1997 are significant, it is very evident that much of the Indiana production is shipped "out of state," including to Ontario. The Indiana plants continue to be an effective force in the housing industry in the United States on a wide

geographic basis. During the early 1970s, Alberta and British Columbia held similar positions of prominence in the Canadian manufactured housing industry, partly because of resource activity (tar sands, gas plants and other resource-based projects), general economic activity of the time and strong provincial government support of the industry including support of the CSA Z240 MH standards and associated regulatory matters.

Park developers and operators

There continues to be a number of park operators in Canada buying product directly from factories. This method of distribution needs further study because its impact on the industry could be significant in future years. In Ontario, some park operators are importing product from the United States (in spite of the unfavourable dollar exchange). Others in the same province are building their own homes. Obviously, park operators should be part of the revitalization of the manufactured housing industry in Canada.

Manufactured homes sold with land

According to some U.S. manufacturers, there are an increasing number of HUD Code homes being sold in the United States that are tied to land with normal mortgaging. This situation should be monitored by the Canadian industry to assist its own efforts to increase this type of sale in Canada. A number of states have instituted formal "city in fill" programs using HUD Code product. According to the MHI, multi-section shipments of HUD product in the United States represented 58 per cent of all HUD shipments during 1997. This compares to 52 per cent in 1996, and 35 per cent in 1981. The trend to multi-section HUD homes could well be an indication that many of these "in fill" and similar U.S. programs are having an impact to the benefit of manufacturers who are building HUD product.

This whole discussion leads to the observation that the need for land use regulations that are less biased against manufactured housing products in Canada must be addressed aggressively by the industry. The question of land use is complex and, while all areas of the country are experiencing land use problems, there are different specific problems in different parts of the country.

The subject of land use is a major, if not the major, reason for the difference of market penetration in Canada and the United States. Simply put, while the Americans have their own significant challenges with land use matters, they have done a better job of gaining acceptance for the product on a national basis. In large measure, this is due to a national code and the effectiveness of the MHI as a national association. It has been reported that the MHI plays a role of "legal watchdog" in zoning matters. The MHI has created a binder of legal decisions related to zoning decisions in the United States. This association also has in-house legal resources to tackle cases that are critical on a national basis. Certainly, such resources are not available to the CMHI or to MHI Canada.

While outside of the terms of reference of this project, it is recommended to the industry and to CMHC that this matter of land use and associated acceptance of manufactured home products be the subject of further study and subsequent action. This effort must involve industry provincial associations in a significant manner in order to arrive at meaningful results.

Customer expectations in Canada and the United States

In plant tours during this project, there was a strong perception that Canadians are less inclined than Americans to accept products that are built to a basic performance code such as HUD. Part of the reason is because of the upscale approach in the housing industry in Canada in recent years. Consider the development of energy efficient homes that, for good reasons, have been promoted by governments in Canada.

However, in discussions with mobile home manufacturers throughout the country during this project, a strong impression was received from manufacturers that is summarized

by the following quotation from an industry representative.

> This energy conservation thrust has increased the cost of our product in a very significant manner. First we increased the levels of insulation and air tightness beyond the levels of reasonable economic return. Then we end up with a house in which you could grow mushrooms. It is often difficult to purchase a furnace for a manufactured home that is sufficiently low in output to ensure anywhere close to an optimum thermostatically controlled heating system. As well the homes are now so air tight that we are forced to put air exchangers in the house with associated increased costs. To argue against these moves as they developed became equivalent to arguing against "motherhood" and the cost of our product continued to increase. Now many customers expect the exterior walls to be built from 2" x 6" because of the energy conservation thrusts.

This background of less than adequate concern for housing affordability is, to some extent at least, at the root of higher expectations in Canada. Having said all of that, there still is and always will be a need for affordable housing in Canada. The manufactured housing industry in Canada must look at the situation as an opportunity. The industry has the innovative skills to respond in an effective manner to this opportunity, and might wish to explore district heat supplies in parks and manufactured housing subdivisions and not put furnaces in the homes themselves. Perhaps this could be part of the proposed land use study.

Work on this concept, which is not new, is under way in a number of places. The forces of the market will always dictate the type of product manufactured in any given market area. However, as stated previously, it is quite reasonable for the Canadian industry to think big but the industry must never forget its roots, i.e., *affordable housing*. As CMHC and the NRC have correctly pointed out to the author during this project, the concept of affordable housing includes more than just the initial cost of the house, as fundamentally important as that might be. The concept of ongoing costs, such as energy costs, must be part of the affordability equation.

Summary and comments

There is a real need for closer cooperation between the sellers of the manufactured homes to the consumer and the manufacturers themselves. Traditional mobile home dealers, park operators, distributors and all of those engaged in direct sales of manufactured homes to the consumer are an important component of the total supply chain of the industry. It is hoped that this important distribution component of the industry will contribute to the needed revitalization of the manufactured housing industry. Indeed, if this revitalization is to be successful the distributors must be part of the process.

The subject of land use is a major, if not the major, reason for the difference of market penetration in Canada and the United States.

The reconciliation of increased customer expectations in Canada and affordability of product must be addressed in an effective manner by the industry.

CHAPTER 8: PROVINCIAL AND REGIONAL DIFFERENCES

The Maritime region of Canada has done a relatively more effective job in market penetration than other regions of the country. In essence, they have seen opportunity where others might see problems.

Market trends

By reviewing the data supplied by the CMHI for Canada, an examination of the last 11 years of activity in the factory-built housing industry in Canada has been conducted and some interesting and useful observations can be made. Table 10 contains a significant amount of comparative data which are reasonably self-explanatory. The activity in Yukon and the Northwest Territories is not included in these data. (Single family start information is not available for these areas but factory-built housing shipment data are available from the CMHI).

In addition figures 4 and 5 which come directly from Table 10 are included for examination. These graphs illustrate the comparative market penetration trends for three different regions: the Maritimes, Western Canada and Central Canada.

From Table 10 and figures 4 and 5, a number of interesting observations can be made.

- While Central and Western Canada certainly have the best performance in total shipments of factory-built homes during the 11-year period (some 36,593 units in Central Canada and 32,570 units in Western Canada compared to 12,788 units in the Maritimes), the Maritimes outperformed the whole country in terms of penetration of the housing market (11.71 per cent versus 7.87 per cent in Western Canada and 5.57 per cent in Central Canada). The regional comparisons of market penetration trends are clearly illustrated in figures 4 and 5.

- For the 11-year period, the ranking of penetration of the housing market (factory-built housing as a percentage of the total of factory-built housing shipments and single family starts) on a provincial basis is identified in Table 11.

Québec continued to be an area of solid activity for the industry during a 10-year period from 1987 to 1996. (It should be noted that some people in the industry question some of the CMHI Québec shipment data for recent years.) In Québec, most of the industry activity seems to be in modular homes (approximately 80 per cent) as opposed to Z240 product.

With a population of approximately 10 million people, it is still bewildering to see the industry activity and market penetration in Ontario in such a sad state. A fundamental problem, according to the manufacturers, is the lack of available land for factory-built homes. While there has been activity on this matter by the industry provincial association, much more must be done. In addition, the fact that mobile homes are not presently able to be included in the Ontario New Home Warranty Program (ONHWP) has been described as the single biggest impediment to a healthy Ontario mobile home industry. The president of MHI Canada is very active in meeting this industry challenge in Ontario. Working in concert with the provincial association, they are making noteworthy progress.

Although Newfoundland is the lowest performing province from a market penetration perspective, there should be opportunity for the industry in the future with the increased resource development activities in that province.

- At the bottom of Table 10, there are data showing the percentage of factory-built housing that was Z240 product during the period by region. It is interesting to note that there seems to be a statistical relationship between market penetration and the percentage of factory-built housing that is Z240 product. Consider the figures in Table 12.

Figure 4:
Comparison of Maritimes & Western Canada trends of factory-built housing as percentage of the total of factory-build housing and single family starts

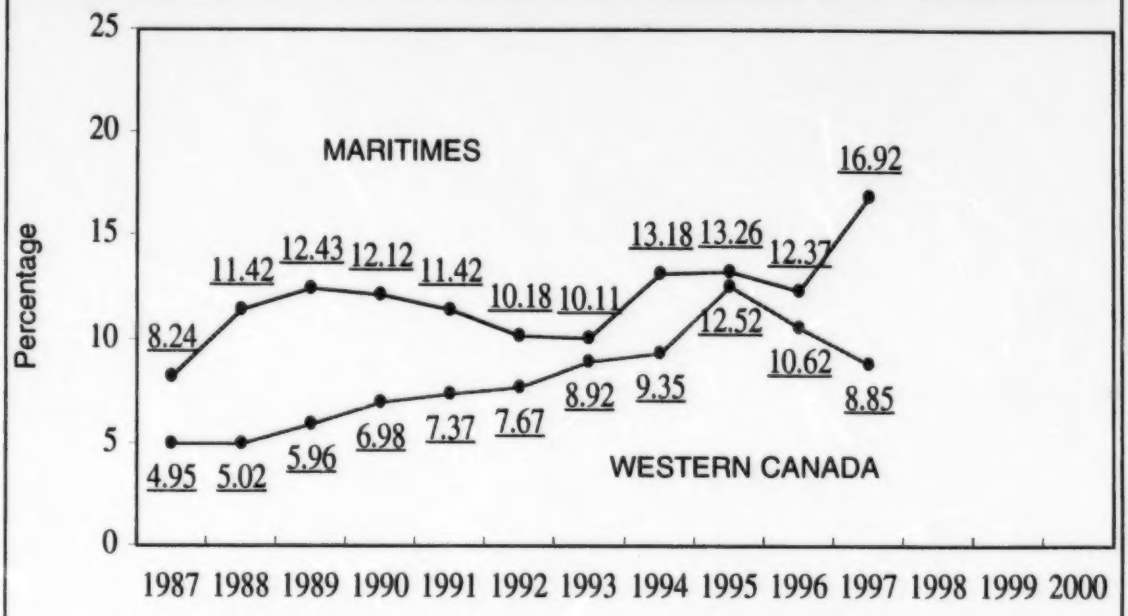


Figure 5:
Comparison of Maritimes & Central Canada trends of factory-built housing as a percentage of the total of factory-built housing and single family starts

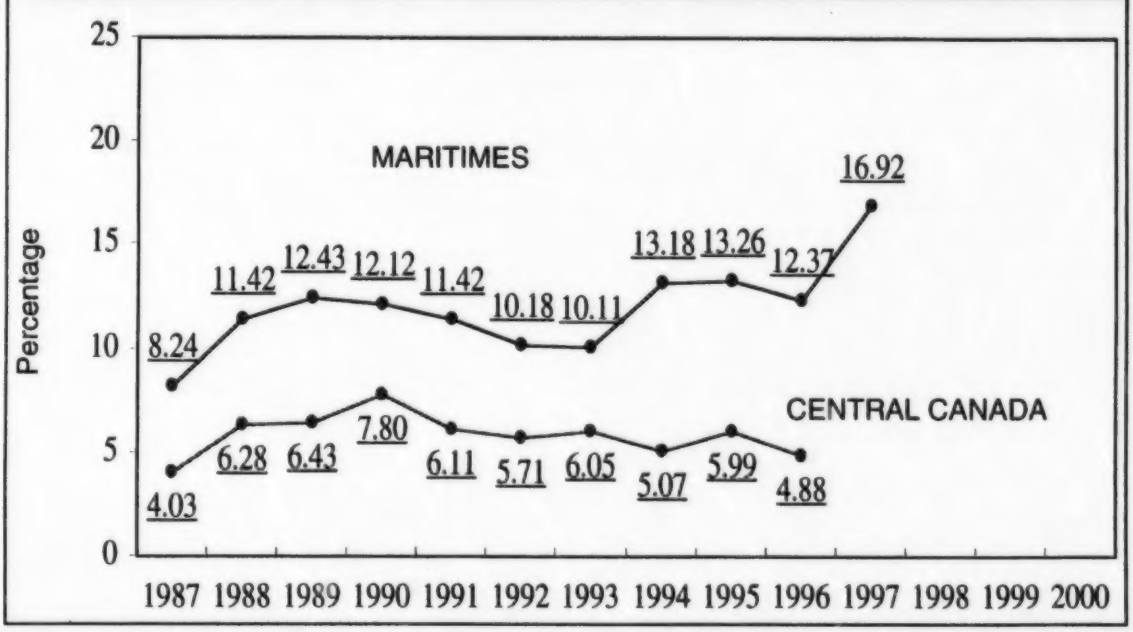


Table 10:
Canadian provincial and regional market penetration data

(A) Maritimes

	Newfoundland Factory Built	Newfoundland Single Fam. Sts.	Factory Built - % of Total	P.E.I. Factory Built	P.E.I. Single Fam. Sts.	Factory Built - % of Total	Nova Scotia Factory Built	Nova Scotia Single Fam. Sts.	Factory Built - % of Total	New Brunswick Factory Built	New Brunswick Single Fam. Sts.	Factory Built - % of Total	Maritimes Factory Built	Maritimes Single Fam. Sts.	Factory Built - % of Total
1987	9	2,539	0 35	77	776	9.03	394	4,486	8 07	531	3,461	13.30	1,011	11,262	8 24
1988	33	2,865	1 14	143	825	14 77	809	4,362	15 64	493	3,409	12.63	1,478	11,461	11 42
1989	38	2,969	1.26	118	564	17 30	625	3,932	13.72	797	3,648	17.93	1,578	11,113	12 43
1990	28	2,494	1.11	121	604	16 69	551	4,134	11.76	667	2,679	19.93	1,367	9,911	12 12
1991	17	2,152	0 78	65	438	12 92	463	3,002	13.36	502	2,532	16.55	1,047	8,124	11.42
1992	2	1,612	0 12	70	488	12.54	247	3,452	6.68	640	2,931	17 92	959	8,483	10 16
1993	13	1,572	0 82	75	531	12 38	255	3,351	7.07	610	3,022	16 80	953	8,476	10.11
1994	6	1,461	0 41	86	555	13 42	540	3,770	12.53	695	2,956	19 04	1,327	8,742	13 18
1995	3	1,165	0 26	60	364	14 15	423	3,040	12.21	476	1,722	21 66	962	6,291	13 26
1996	0	1,395	0 00	68	430	13 65	508	3,278	13.42	451	2,173	17 19	1,027	7,276	12.37
1997	1	1,220	0 08	86	374	18 70	459	1,220	27.34	523	2,435	17 68	1,069	5,249	16 92
Totals (11 Years)	**150**	**21,444**	**0.69**	**969**	**5,949**	**14.01**	**5,274**	**38,027**	**12.18**	**6,385**	**30,968**	**17.09**	**12,778**	**96,388**	**11.71**

(B) Western Canada

	Br. Columbia Factory Built	Br. Columbia Single Fam. Sts.	Factory Built - % of Total	Alberta Factory Built	Alberta Single Fam. Sts.	Factory Built - % of Total	Saskatchewan Factory Built	Saskatchewan Single Fam. Sts.	Factory Built - % of Total	Manitoba Factory Built	Manitoba Single Fam. Sts.	Factory Built - % of Total	Western Can. Factory Built	Western Can. Single Fam. Sts.	Factory Built - % of Total
1987	563	16,755	3.25	839	10,244	7.57	128	3,123	3 94	296	4,925	5.67	1,826	35,047	4 95
1988	649	18,239	3.44	903	10,398	7.99	62	2,308	2 62	223	3,823	5 51	1,837	34,768	5 02
1989	1,103	22,521	4.67	1,195	13,210	8 30	57	1,439	3.81	201	3,166	5 97	2,556	40,336	5 96
1990	1,319	19,535	6.32	1,270	14,613	8 00	41	1,128	3 51	248	3,091	7.43	2,878	38,367	6.98
1991	1,231	19,333	5 99	1,018	10,265	9 02	33	806	3.93	285	1,873	13.21	2,567	32,277	7 37
1992	1,827	22,860	7.40	1,225	14,517	7 78	37	1,901	1.91	340	1,993	14.57	3,429	41,271	7.67
1993	1,859	18,743	9 02	1,193	13,320	8 22	43	1,375	3 03	396	2,200	15.25	3,491	35,638	8 92
1994	2,012	17,915	10.10	1,201	12,907	8 51	72	1,614	4 27	339	2,714	11 10	3,624	35,150	9 35
1995	1,683	11,581	12 69	1,456	10,096	12 60	70	1,341	4 96	355	1,875	15 92	3,564	24,893	12.52
1996	1,621	12,447	11.52	1,424	12,949	9 91	129	1,612	7 41	222	1,564	12 43	3,396	28,572	10 62
1997	1,352	12,911	9 48	1,535	18,170	7.79	243	1,954	11 06	272	2,019	11.87	3,402	35,054	8 85
Totals (11 Years)	**15,219**	**192,840**	**7.31**	**13,259**	**140,689**	**8.61**	**915**	**18,501**	**4.69**	**3,177**	**29,243**	**9.80**	**32,570**	**381,373**	**7.87**

(C) Central Canada

	Ontario Factory Built	Ontario Single Fam. Sts.	Factory Built - % of Total	Québec Factory Built	Québec Single Fam. Sts.	Factory Built - % of Total	Cent. Canada Factory Built	Cent. Canada Single Fam. Sts.	Factory Built - % of Total
1987	1,184	65,299	1.78	2,884	31,696	8.34	4,068	96,995	4.03
1988	1,308	57,563	2 22	4,466	28,572	13 52	5,774	86,135	6.28
1989	1,340	53,916	2.43	4,101	25,207	13 99	5,441	79,123	6.43
1990	1,199	32,793	3.53	3,704	25,144	12.84	4,903	57,937	7 80
1991	717	26,455	2.64	2,511	23,181	9 77	3,228	49,636	6 11
1992	787	27,955	2.74	2,065	19,099	9.76	2,852	47,054	5 71
1993	995	26,447	3.63	1,840	17,591	9.47	2,835	44,038	6.05
1994	960	30,216	3 08	1,657	18,824	8 09	2,617	49,040	5 07
1995	538	20,124	2 60	1,600	13,428	10 65	2,138	33,552	5 99
1996	501	27,019	1 82	1,647	14,818	10 00	2,148	41,837	4.88
1997	589	35,401	1.64	589	35,401	1.64	Note—Québec data are not available for 1997		
Totals (11 Years)	**10,118**	**403,188**	**2.45**	**26,475**	**217,560**	**10.85**	**36,593**	**620,748**	**5.57**

Table 10:
Canadian provincial and regional market penetration data (*Cont'd*)

	(D) Z240 Product as a % of Total Factory-Built Housing																					
	Z240	Maritimes A377	Z240 as % of Total		Z240	Western Canada A377	Z240 as % of Total		Z240	Central Canada A377	Z240 as % of Total	
1987	956	55	94 56	1987	914	912	50.05	1987	636	3,432	15 63	
1988	1,098	380	74 29	1988	1,489	348	81.06	1988	1,312	4,462	22 72	
1989	1,455	123	92 21	1989	2,030	526	79.42	1989	1,119	4,322	20 57	
1990	1,184	183	86 61	1990	2,146	732	74 57	1990	840	4,083	17.13	
1991	855	192	81 66	1991	1,800	767	70 12	1991	815	2,413	25.25	
1992	828	131	86 34	1992	2,122	1,307	61 88	1992	622	2,230	21.81	
1993	796	157	83 53	1993	1,595	1,896	45 69	1993	682	2,173	23.35	
1994	899	428	67 75	1994	1,545	2,079	42.63	1994	590	2,027	22 54	
1995	962	0	100 00	1995	1,129	2,435	31 68	1995	122	2,016	5.71	
1996	639	388	62 22	1996	1,132	2,264	33 35	1996	86	2,062	4.00	
1997	680	389	63 61	1997	1,221	2,181	35.89	1997	119	470	20.20	
Totals (11 Years)	10,352	2,426	81.01	Totals (11 Years)	17,123	15,447	52.57	Totals (11 Years)	6,923	29,670	18.92	

Table 11:
Factory-built housing as a percentage of total factory-built housing shipments and single family starts combined

Province	Percentage
New Brunswick	17.09
Prince Edward Island	14.01
Nova Scotia	12.18
Québec (does not include 1997 data)	10.85
Manitoba	9.80
Alberta	8.61
British Columbia	7.31
Saskatchewan	4.69
Ontario	2.45
Newfoundland	0.69

Table 12:
Percentage of market penetration and Z240 product

Region	% Market penetration	% Z240 product
Maritimes	11.71	81.01
Western Canada	7.87	52.57
Central Canada	5.57	18.92

These regional comparisons appear to further reinforce the importance of the Z240 standards and the product built to these standards.

Some regional operational comparisons

In 1994, Industry Canada conducted an inter-firm comparison study of the manufactured housing industry in Canada. Industry Canada made available for this project the general version of the report of the study. Twenty-eight plants participated in the 1994 study: 10 in Western Canada, four in Ontario, 10 in Québec and four in the Maritimes.

The summary review of the Industry Canada study of 1994 along with appropriate observations of the current situation in 1998 are as follows.

- **Participants**. Twenty-five Canadian companies operating a total of 28 manufacturing establishments spread throughout seven provinces, took part in the 1994 inter-firm comparison of manufactured housing. Apart from four panelized housing manufacturers, all participants were manufacturers of modular or mobile homes largely directed at the residential market.

- **Overall sales**. Of the 28 participants, sales amounted to $266 million, representing an average of $9.5 million per plant. The plants employed 1,680 production workers for an average of 60 per plant. Important differences were noted among the regions with the largest plants being found in Western Canada and the Maritimes, and the smallest in Québec. Based on plant visitations during this project, it seems that many of these same observations contained in the 1994 Industry Canada report could be made in 1998. However, shipment data indicate that sales are down on a total basis compared to 1994.

- **Exports**. Less than half of all participants were engaged in exports in 1994 and, with one exception, this activity accounted for less than 15 per cent of each plant's output; increased interest in export was expressed in 1995. It appears that a number of manufacturers visited during this project did increase activities in attacking export markets after 1994 but with little real profitable success, although at least one manufacturer reported satisfactory export experience.

  With the recent Asian flu problems, there has been little success in exporting to the Pacific Rim by the Canadian industry. There certainly still appears to be continuing real interest in the European markets, particularly Germany, for some Canadian manufacturers. In the main, however, it was clear that the "bloom was off the rose" regarding overseas housing markets during the plant tours undertaken on this project.

  In the U.S. market, there is a notable regional difference. One gets the strong impression that Western Canadian manufacturers are not organized from a strategic or marketing point of view in any attack on the U.S. market. In the Maritimes, however, it was clear that in the case of three of the four plants visited, they have made a successful entry, although not involving large numbers of homes, into the New England market place and this has been going on for some time.

- **Profitability.** The 28 participants had a median operating margin of 3.4 per cent for 1994 and a median return on assets of 7.7 per cent. Seven firms reported a loss and eight more showed a modest return of less than 10 per cent. Such results seemed quite low at the time (i.e., 1994) to Industry Canada, especially since profit was calculated before interest charges and income taxes. With some possible exceptions in the Maritimes, plant visits during this project indicated that present profitability is less than it was for most plants in 1994.

  Operating profit margins were also the highest in the West (median of 5.0 per cent) and the lowest for Québec (0.6 per cent), with Ontario and Maritime company results falling between these two extremes (medians of 4.0 and 2.4 per cent respectively). Although there is likely little relative difference in operating profit margins between regions at present compared to 1994, it is possible and probable that the median for the Maritimes has increased and the median for the West has dropped, based on observations and discussions during plant visits carried out for this project.

- **Capacity utilization**. The rate of capacity utilization was generally low during 1994, with only three firms reporting an 80 per cent rate and nine plants operating at below 50 per cent capacity. Once again, based on plant visitations during this project, it is very likely that, if anything, plant utilization is less than it was in 1994 on an overall basis. However,

it is certainly possible, and even probable, that capacity utilization has increased in certain Maritime plants.

Maritime companies operated at the highest level of capacity utilization (median of 73 per cent) and also reported the largest sales increase of all four regional groups in 1994. This does not appeared to have changed since 1994.

- **Auxiliary activities**. The comparative analysis in 1994 suggested that auxiliary activities, such as the transportation and installation of homes, did not generate the same level of net income as manufacturing, or that the revenues derived from these activities did not compensate enough for the large, additional expenses they give rise to. This subject was discussed briefly at a number of plants during the project and the impression received is that this is still a problem area. It requires the application project management skills that are missing in many companies and, indeed, in many industries in the 1990s. It is possible that some formal training in project management is part of the solution to this business challenge.

  In the United States, some HUD manufacturers are successfully using traditional homebuilders as dealers for manufactured housing product. In this arrangement, the homebuilder assumes responsibility for the product at the factory door. In Canada, this U.S. model of distribution is being copied by some Canadian modular homebuilders with varying degrees of success.

  Thus, companies only engaged in manufacturing generally reported a much higher operating profit margin (median of 5.0 per cent) and return on assets (16.1 per cent) than those also doing site work (medians of 1.7 and 4.4 per cent respectively). There was no evidence gleaned during this project that this situation has changed in 1998.

  Marketing and selling, and administration expenses of companies doing site work were 64 and 90 per cent higher, respectively, than those companies engaged in manufacturing only. It appeared, therefore in 1994, that the transportation and installation activities imposed a considerable burden on marketing and administrative functions. There was no evidence gleaned during this project that this situation has changed in 1998.

  In general, differences in regional results could be traced back to the type of activities conducted by the participants in each region in 1994. Thus, Western firms which tended to limit their work to manufacturing homes (and still do), reported by far the highest return on assets in 1994 of all the four regional groups (median of 15.3 per cent) whereas Québec participants which were all involved in the transportation and installation of houses, showed the lowest return (0.9 per cent). There was no evidence gleaned during this project that this situation has changed, although no Québec plants were visited during this project.

- **Inventory**. Inventory levels were by far the highest among Western firms and their average level of accounts receivable was exceeded by the Maritime participants only. There was a sense during plant visits that many companies had effectively used the 1994 report to benchmark these important business measurements and have, as a result, shown improvement.

- **Labour costs.** The hourly cost of production labour was highest in the West ($17.96) and lowest in the Maritimes ($12.46). Although this was not explored in any depth during plant visits, it appears that the relative situation on labour costs has not changed since 1994.

- **Quality and service**. Quality and service were identified as the two most important factors for competing in the manufactured housing industry in 1994. The subject of

quality management is addressed in the following segment of this report.

Quality management practices

During plant visits, a wide range of quality management practices were observed, everything from a primitive attempt to inspect quality in the product (simply not possible) to a fully certified ISO 9001 factory and all approaches in between. The following are a number of observations on this subject.

The Industry Canada 1994 report

In the Industry Canada report of 1994, it was pointed out that, globally, Canadian manufactured housing inter-firm study participants made broader use of quality management practices than companies in the entire wood industry (47.0 per cent compare to 39.5 per cent). However, this measurement was somewhat below the percentage of use found in manufacturing industries as a whole (49.5 per cent). Plant visits during this project indicated that the observations contained in the Industry Canada report of 1994 are still true today.

Ian Bazley's report

As mentioned in Chapter 2, Mr. Ian Bazley's report (1996) is full of sound suggestions to assist manufacturers in facing the challenges of the changing market, including the application of quality management techniques. In plant visits during this project, it was observed that some people are using this report in an effective manner. However, some people are treating it with close to disdain and this is unfortunate. The remarks about the report often contained a somewhat puzzling arrogance that is not generally justified. This arrogance was indicated by a remark such as: "What can this guy teach us?" It seems apparent that the purpose of Mr. Bazley's report was to make people aware of the techniques available to the Canadian manufactured housing industry, based on observations of U.S. practices, and industry people would do well to take advantage of this resource.

Summary and comments

There has been a significant difference in market penetration of factory-built housing over the last 11 years in different regions of the country with the Maritimes leading the way in this important measurement.

The market data indicate that there may be a correlation between the sale of Z240 product and higher market share for factory-built homes. However, shipment data for Québec during the 10 years between 1987 and 1996 indicate that the factory-built market penetration has remained in the eight to 12 per cent range with a large portion of the sales activity focussed on modular homes (approximately 80 per cent).

In 1994, Western manufacturers were the most profitable. This is likely still the case but recent plant visitations indicate that the lead in profitability by Western manufacturers may be shrinking with reduced profits in the West and increased profits in the Maritimes.

There is some need for increased emphasis on quality management techniques in all regions of the country, although there are some manufacturers who are doing very well in this regard.

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ENDNOTES

1. "The National Commission on Manufactured Housing, final Report, 1994." See also detailed calculations prepared by Steven Winter Associates in a cost analysis paper for the Commission, dated September 20, 1993 and a technical document prepared for the Commission, "Standards Options Paper" dated September 10, 1993.

2. Predicated on a markup of 150 per cent of material costs. Another way to say the same thing is that material cost is, at most, 66.7 per cent of selling price. In the 1994 Industry Canada Interfirm Study (unpublished) this ranged from 52.3 to 67.5 per cent in 11 Canadian plants.